

# CANADIAN MACHINERY

## AND MANUFACTURING NEWS

Vol. XXV., No. 21

Published by the MacLean  
Publishing Company, Limited, Toronto

May 26, 1921

\$4.00 a Year  
Subscription Price

READ AND PASS TO

Check

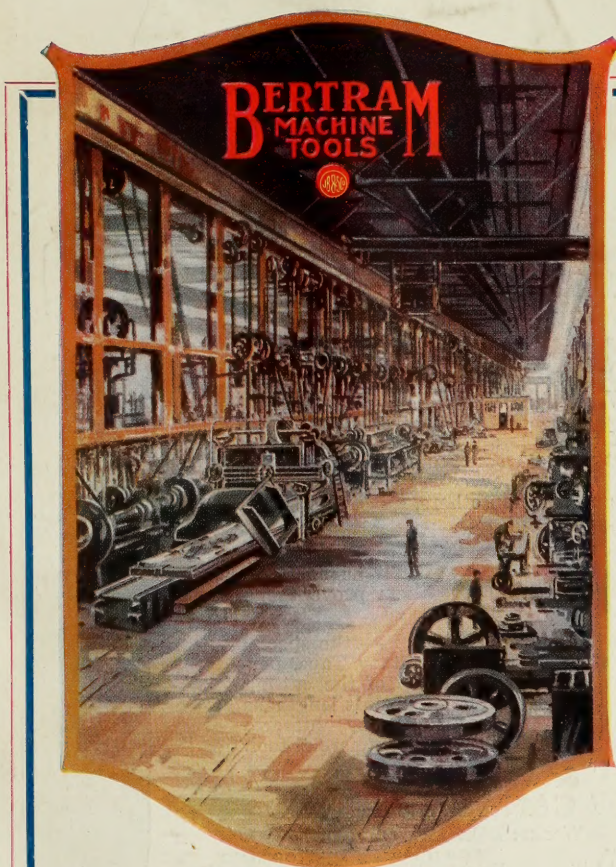
See Page

READ AND PASS TO

Check

See Page

|  |  |  |  |  |  |
|--|--|--|--|--|--|
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |



### *faith, courage and industry*

have carried Canada through many crucial periods of history. These Anglo-Saxon qualities should be uppermost to-day. They are needed to revive Canadian industry. To avoid a crisis more smoke must issue from Canadian chimneys; more wheels must turn, and the wage-earner now out of work must be employed.

Those orders you are permitting to "hang fire" should be placed now. There is nothing to be gained by holding off for better conditions. Don't wait for the other fellow to act. If everybody waits there will be business for nobody.

Let your faith in Canada give you courage to stimulate Canadian industry by placing every pending order for commodities with some responsible Canadian firm—NOW!

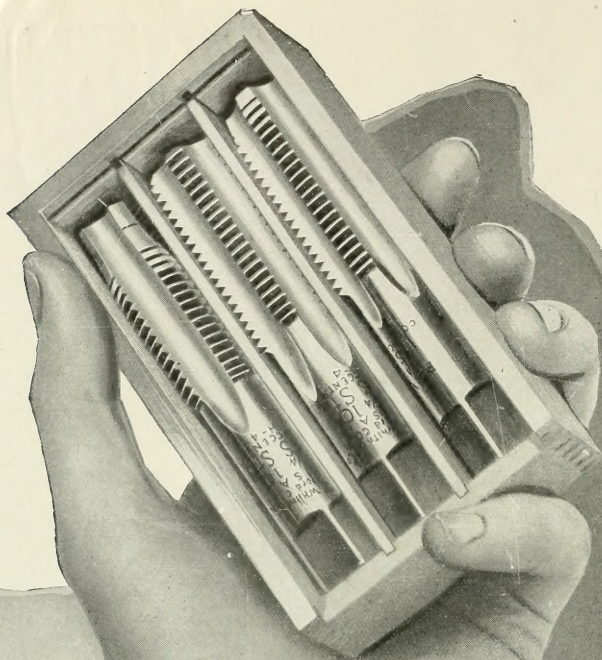
You owe it to Canada, to Canadian industry and to yourself to take immediate action.

## The John Bertram & Sons Co., Limited, Dundas, Ont.

Manufacturers of Machine Tool Equipment for Railroad, Shipbuilding,  
Steel Bridge and General Machine Shop

HALIFAX MONTREAL TORONTO WALKERVILLE WINNIPEG VANCOUVER





**P  
&  
W**

## Pratt & Whitney Taps

"With the 'Con-eccentric' Land"

P & W Taps are **good** taps—easily the best where accuracy and high speed are essential. They cost more to buy, but less to use than others.

If you're doing work that calls for big production and for unusual precision, give them a trial. You'll be back for more when you see them prove themselves.

The "con-eccentric" land — the special feature of Pratt & Whitney Taps, permits sharpening on face of the cutting edge without affecting size. It lengthens life and assures accuracy hitherto thought impossible in a commercial tool.

**PRATT & WHITNEY COMPANY  
OF CANADA, LIMITED**

Works: DUNDAS, Ontario

MONTREAL  
723 Drummond Bldg.

HALIFAX  
Roy Building

TORONTO  
1002 C.P.R. Bldg.

WINNIPEG  
1205 McArthur Bldg.

VANCOUVER  
B. C. Equipment Co.

WALKERVILLE, 103½ Sandwich Street



# The BERTRAM MACHINE TOOLS Page

## No. 4 Single Punch and Shear 12" Throat Motor Drive through belt

*Fitted with Plate Shearing Attachments*

### Capacity

To punch 1" hole through 1" Plate

To shear 1" Plates

To " 6"x1" Flat Bars

To " 1 3/4" Round Bars

To " 4x4x3/8" Angles

**The John Bertram  
& Sons Co., Limited**

DUNDAS, ONTARIO

MONTREAL  
723 Drummond Bldg.

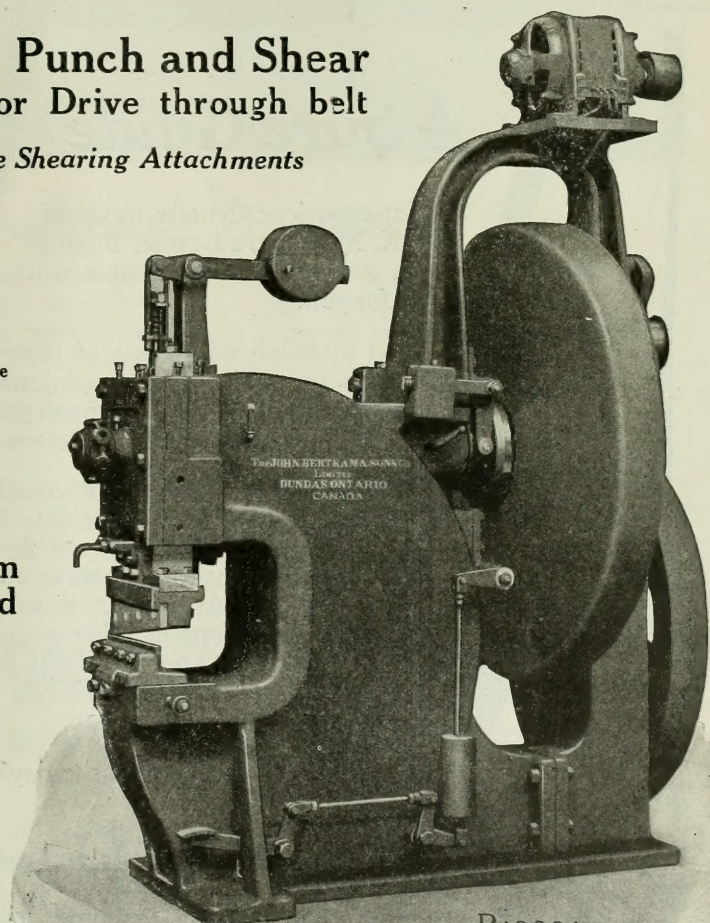
TORONTO  
1002 C.P.R. Bldg.

VANCOUVER  
609 Bank of Ottawa Bldg.

WALKERVILLE  
103 1/2 Sandwich Street

WINNIPEG  
1205 McArthur Bldg.

HALIFAX  
Roy Building



P12224



# D.K. McLaren's

## Genuine British Oak Tanned Leather Belting



Genuine Oak



Genuine Oak

### A Sure Guide

What experienced users think of D. K. McLaren's Leather Belting is a sure guide as to what it will do for you.

Get in touch with some of these users and find out their opinions. Write us; we'll gladly furnish you with some names and addresses.

You'll hear that it is a non-slipping, practically stretchless belting; that it insures you against breakdowns and undue loss of power. Altogether, in so far as the opinions of other people *can* convince you, you will *be* convinced that it is positively the best belting you can buy.

Why not write us to-day?

**D. K. McLaren, Limited**

Head Office and Factory:

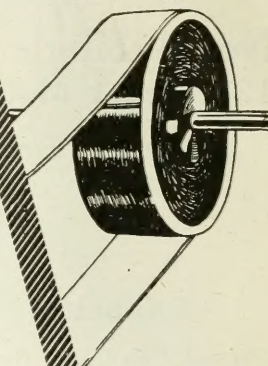
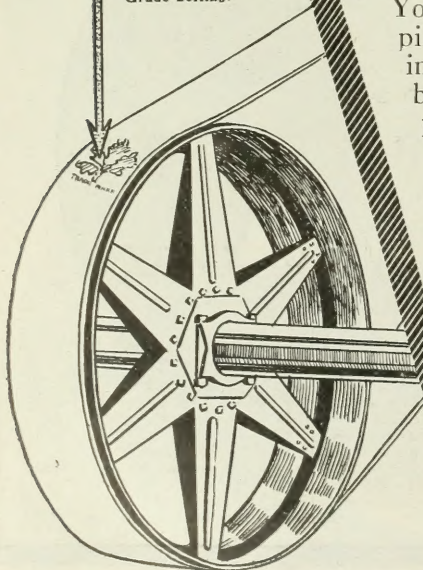
351 St. James Street, MONTREAL, P.Q.

TORONTO, ONT., 194 King St. West

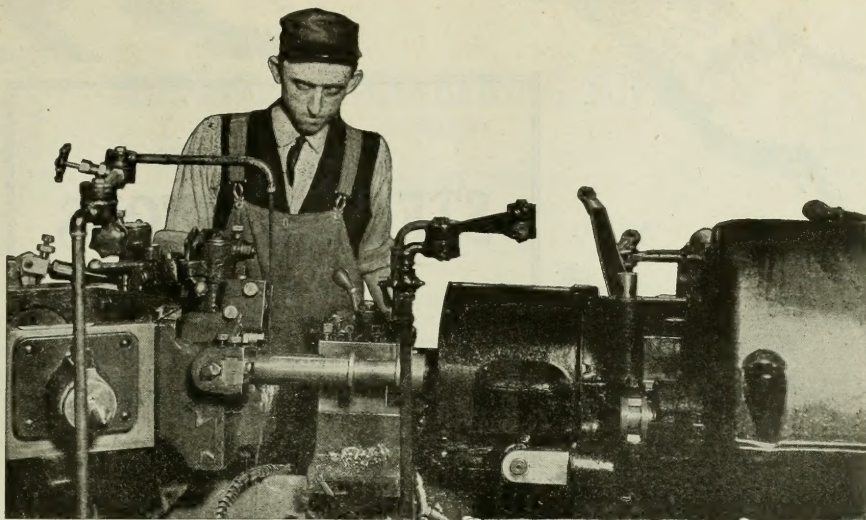
ST. JOHN, N.B., 90 Germain St.

VANCOUVER, B.C., 334 Cordova St. W.

A Guarantee that is on every piece of D.K. McLaren's High Grade Belting.







## To Decrease Operating Costs

The side carriage is an important part of the W.&S. turret lathe. It reduces operating costs, often by as much as one-half. It operates simultaneously with the turret and independently of it. The side carriage has a separate feed rod.

Take some of the simplest bar jobs; by cutting off with the side carriage while the turret tools are finishing their work, you save most of the cutting off time.

Here is the picture of a W.&S. 2-A. in a railroad shop. This machine makes

bolts, pins, oil cups, valve parts, piston rods, and many other parts used in the repair of locomotives and cars.

On all these parts both turrets operate together.

Take this feature and the fact that the machine operates easily and accurately, and you know why the machine is popular with the shop men. It delivers the goods.

Send us blue prints of your parts and we'll tell you how long it will take to do your work the W.&S. Way.

## The Warner & Swasey Company Cleveland, U.S.A.

### BRANCH SALES OFFICES:

NEW YORK: Singer Building.

CHICAGO: 618-622 Washington Boulevard.

### CANADIAN AGENTS—

A. R. Williams Machinery Company, Ltd., Toronto, Winnipeg,

Vancouver, St. John.

Williams & Wilson, Ltd., Montreal.

### FOREIGN AGENTS—

Charles Churchill & Company, Ltd., London, Birmingham, Manchester, Bristol, Newcastle-on-Tyne, Glasgow.

Allied Machinery Company, Paris, Turin, Zurich, Barcelona, Brussels.

BOSTON: Oliver Building.

RUFFALO: Iroquois Building.

DETROIT: 5928 Second Boulevard.

MILWAUKEE: 209 Sycamore Building.

INDIANAPOLIS: 940 Lemcke Annex.

DAYTON: 518 Mutual Home Building.

Wilhelm Sonesson Company, Malmö, Copenhagen, Stockholm, Gothenburg.

R. S. Stokvis en Zonen, Rotterdam.

Benson Brothers, Sydney, Melbourne, Adelaide.

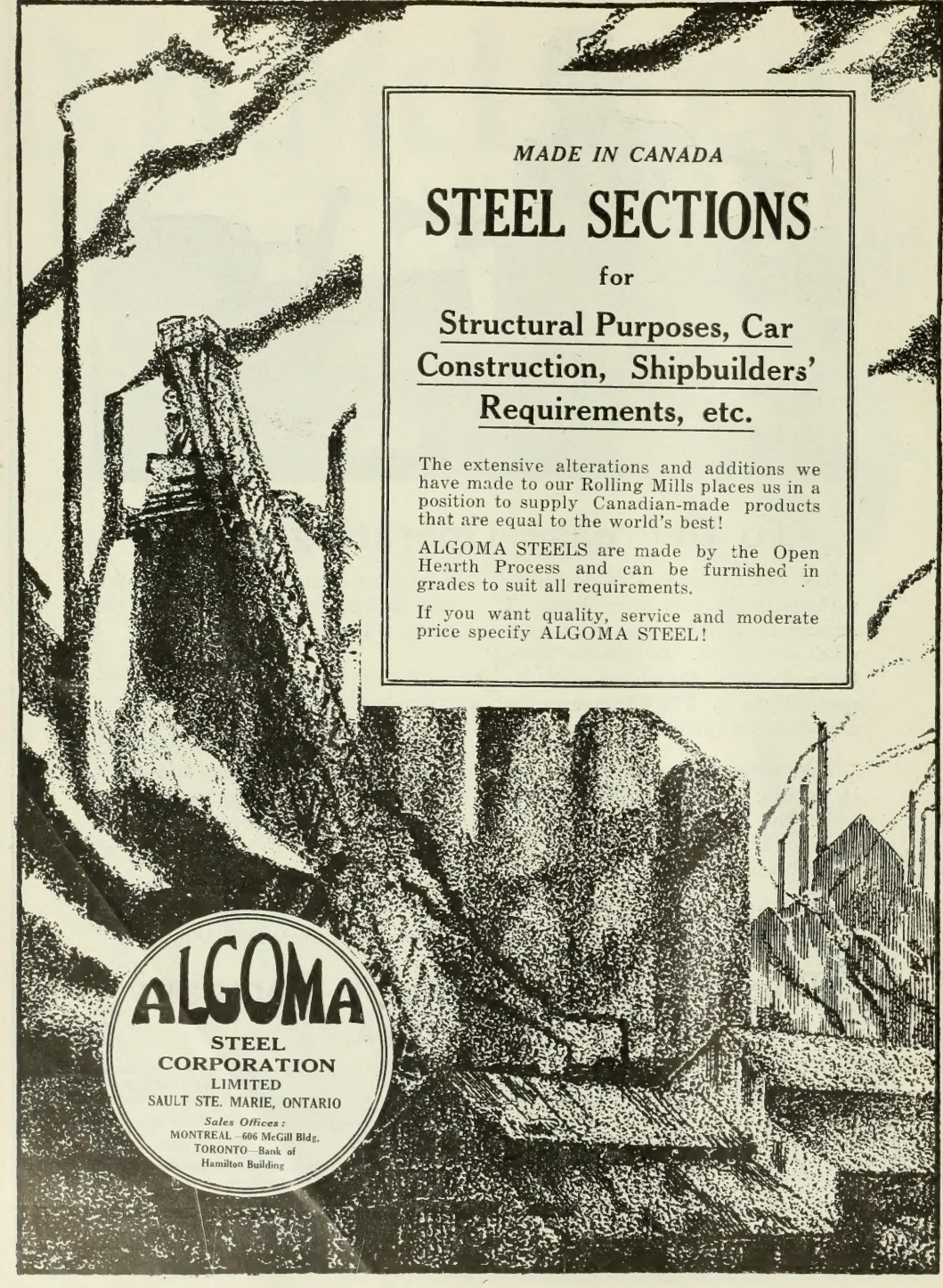
Yamatake Company, Tokyo, Osaka, Nagoya, Fukuoka, Dairen.

McLeod & Company, Calcutta.

Anderson, Meyer & Company, Ltd., Shanghai.

Brossard-Mopin & Company, Saigon, Singapore, Haiphong.





MADE IN CANADA

# STEEL SECTIONS

for

Structural Purposes, Car  
Construction, Shipbuilders'  
Requirements, etc.

The extensive alterations and additions we have made to our Rolling Mills places us in a position to supply Canadian-made products that are equal to the world's best!

ALGOMA STEELS are made by the Open Hearth Process and can be furnished in grades to suit all requirements.

If you want quality, service and moderate price specify ALGOMA STEEL!

# ALGOMA

STEEL  
CORPORATION  
LIMITED

SAULT STE. MARIE, ONTARIO

*Sales Offices:*  
MONTREAL - 606 McGill Bldg.  
TORONTO - Bank of  
Hamilton Building





# SHEFFIELD ENGINEERING SUPPLIES LIMITED

228 CRAIG ST. WEST

MONTREAL

CANADA

REPRESENTING

**Sheffield Twist Drill & Steel Co.**  
LIMITED

SHEFFIELD ENGLAND

"DORMER" BRAND High Speed Twist Drills

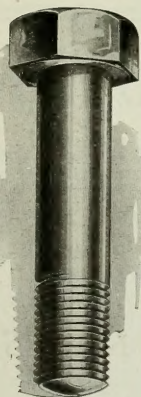
"DORMER" BRAND High Speed REAMERS

**Michael & Joseph Wing**  
LIMITED

SHEFFIELD ENGLAND

"DOMINANT" High Speed Files

M.J.W. Tool Steel, Saws, Etc.



## ACCURACY

Just now all jobbers should have a complete stock of SAE Cap Screws, Plain and Castellated Nuts and Taper Pins to meet the automobile repair trade requirements.

Your rush orders filled promptly by

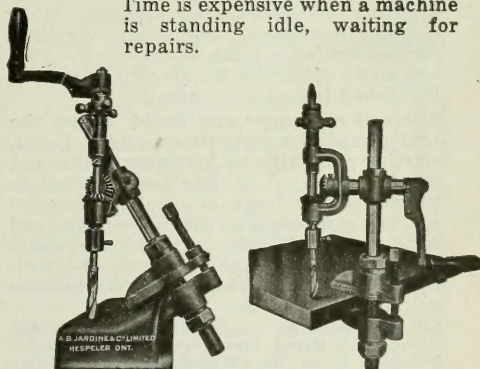
**The Galt Machine  
Screw Co., Limited**  
GALT, ONTARIO

*Eastern Representatives:*  
Messrs. F. BACON & COMPANY  
131 St. Paul Street West, Montreal, Que.

*Western Representative:*  
Mr. D. PHILIP  
138 Portage Avenue, Winnipeg, Man.

## Jardine Universal Ratchet Drill

Time is expensive when a machine is standing idle, waiting for repairs.



On the average repair job, this machine completes the drilling in less than the time required to set an ordinary ratchet to begin.

Weight, 40 lbs. Price, \$26.50 net.

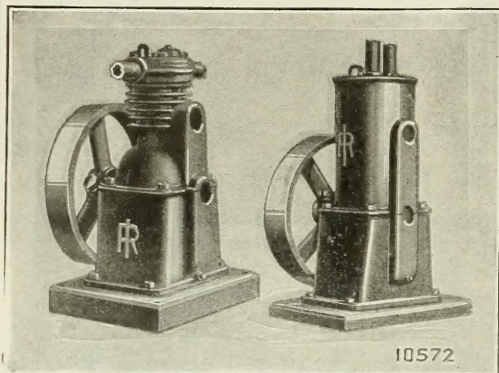
Sold by all Machinery and Supply Houses.

**A. B. JARDINE & CO., Limited**  
HESPELER, ONTARIO



# Why Not Do It With Air?

*A Message of Interest to the  
Small Shop Owner*



10572

"Imperial 14's," one of the many styles of Canadian Ingersoll-Rand Compressors, are made in a wide range of sizes for Stationary and Portable Service and for Gasoline, Electric or Belt Drive. Bulletins 3039 Stationary Type or 3215 Portable Type sent on request.

There are a hundred and one places around your shop where compressed air will cut down time and expense.

Take painting for instance. The air brush will do a quicker and a far better job—and one man can handle it.

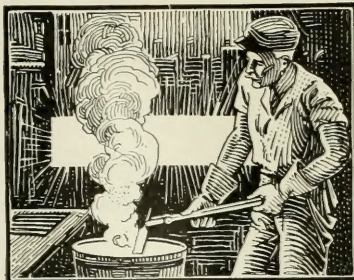
And cleaning—how much time do you lose brushing off the top of machine tools, cleaning motors and brushing in the little corners behind a stack of material? This can all be done with the air jet and the job is finished before you know it.

There is no longer any doubt about the saving made by portable pneumatic hoists, riveting and chipping hammers, drills, and wood borers. This has been definitely proven in the large automobile factories and you can benefit by their knowledge and experience. These portable pneumatic tools can be taken to the work and both the odd jobs and the steady work become paying propositions.

In our extensive line of air machinery you will find Compressors, Hoists, Blow Guns and "Little David" Pneumatic Tools. We will gladly send you bulletins describing these machines.

**CANADIAN INGERSOLL-RAND  
COMPANY, LIMITED**

|        |            |          |           |
|--------|------------|----------|-----------|
| Sydney | Sherbrooke | Montreal | Toronto   |
| Cobalt | Winnipeg   | Nelson   | Vancouver |



## Be Sure Your Files Cut Clean

As soon as a file ceases to cut keenly at every stroke, it has outlived its usefulness.

You will actually save money by throwing it away and buying a new file, because files cost less than workmen's time.

Long, efficient service is ensured by specifying one of these brands when ordering:

**KEARNEY & FOOT  
GREAT WESTERN  
AMERICAN  
ARCADE  
GLOBE**

**FILES AND RASPS**

*Made in Canada by*

**Nicholson  
File Company**

**Port Hope, Ontario**



## $\frac{1}{3}$ to $\frac{1}{2}$ Reduction in Milling Cost

This will be the result of taking small milling jobs from your big millers and putting them up to

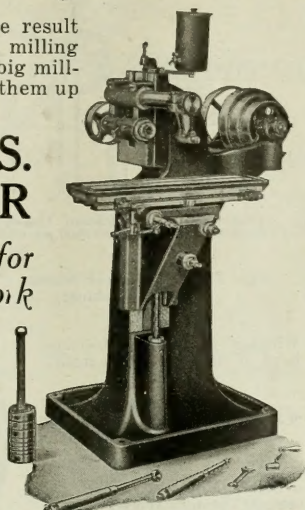
### The U.S. MILLER

*The Miller for  
Small Work*

A small machine takes up less space, requires less power, is easier to operate and is more accurate.

The Paramount Miller of its size. Drop us a line for full details.

United States Machine Tool Company  
Cincinnati, Ohio, U.S.A.



## WHY EXPERIMENT? WE DID IT FOR YOU YEARS AGO



### IMPERIAL GENUINE

For Heavy Engines and  
Extraordinary Hard Work



### HARRIS HEAVY PRESSURE

THE  
COPPER COATED  
CAKE

For Donkey Engines, Saw Carriages, Small Motors,  
Transmission Line Shafting and all steady heavy  
pressure duty.



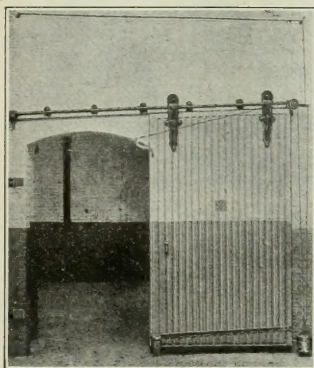
### Matchless

Suitable For Slow-Moving Bearings

Write For Prices

**THE CANADA METAL CO., LIMITED**  
TORONTO HAMILTON VANCOUVER MONTREAL  
WINNIPEG

## AN OUNCE OF PREVENTION



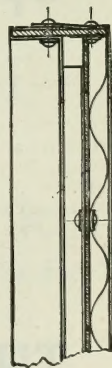
Evans' "Almetl" — The Reliable,  
Enduring Firedoor

EVANS' "ALMETL" Fire Doors are the "ounce of prevention" against the spreading of fire in factory, warehouse, mill or commercial building. Wherever there is a door, it should be an "ALMETL." Stoutly built of heavy corrugated steel, galvanized, and interlined with asbestos roll board, they make an impassable barrier to the most intense fire.

The frame of the "ALMETL" is 3-16" x 2 1/2" Bar Steel, reinforced on all edges by an extra heavy binder of galvanized steel which forms a box for the panel and prevents damage to the door by trucks, etc.

Approved by the underwriters.

Write us for descriptive literature, specifications and prices.



Cross Section.  
Note Rigid  
Construction

SOLE CANADIAN MANUFACTURERS

## Geo. W. Reed & Co., Limited, Montreal



# THE JOHNSON FRICTION CLUTCH

## The Case Against the Countershaft

The old familiar countershaft drive, through cross belts and tight and loose pulleys, stands accused of the following offences against efficiency:

1. Involves needless equipment.
2. Costs too much to set up.
3. Prevents economical and systematic use of space.
4. Operates sluggishly.
5. Multiplies belt troubles and the resultant cost of upkeep.

Modern practice has discarded the antiquated countershaft for the simplicity and efficiency of the clutch drive direct from lineshaft.

### Adopt the Johnson Lineshaft Drive

The economical, efficient and durable method of power transmission through friction control.

#### CANADIAN AGENTS:

WILLIAMS & WILSON, LTD., 84 Inspector Street, Montreal  
CANADIAN FAIRBANKS-MORSE CO., LTD., Montreal, Toronto, Winnipeg

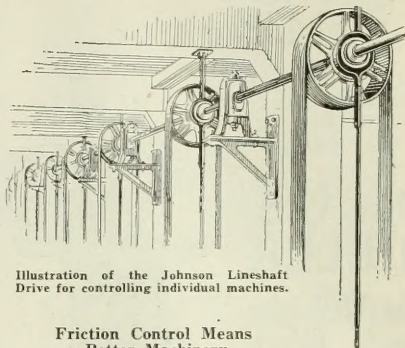
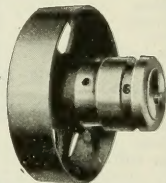


Illustration of the Johnson Lineshaft Drive for controlling individual machines.

Friction Control Means  
Better Machinery

Whether it is applied overhead or in the machine itself.

Write for our Booklet  
"Clutches as Applied to Machine Building"  
and our Yellow Catalog.



**THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.**

## Open a Bank Account in Canada

The present abnormal exchange situation between Canada and the United States is affecting trade relations between the two countries. Exporters in the United States can meet this by opening Bank Accounts in Canada.

This Bank has 730 Branches, of which 626 are located in Canada from the Atlantic to the Pacific Coast. Write for a complete list of Branches and for terms respecting a Canadian account.

## THE ROYAL BANK OF CANADA

Capital and Reserves \$40,000,000

Total Resources \$544,000,000

Head Office: MONTREAL



# CANADIAN STEEL FOUNDRIES LIMITED

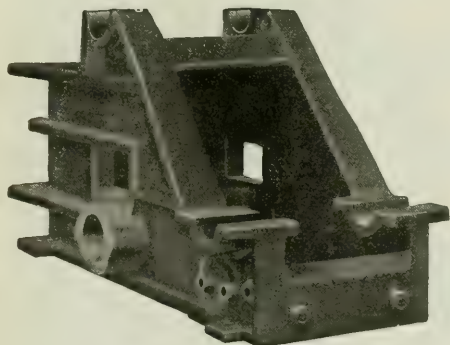
## AMONG OUR PRODUCTS

| O. H. STEEL  | FERRO-ALLOYS  |   | TRACKWORK   |
|--|---|---|---|
| Bolsters<br>Couplers<br>Draft Arms<br>Locomotive Side Frames<br>Machinery Castings<br>Marine Castings<br>Rolling Mill Rolls<br>Wheel Centres | MANGANESE-STEEL   | OTHER ALLOYS  | Diamond Crossings<br>Crosses<br>Frogs<br>Mates<br>Switches<br>Rail Braces<br>Guard Rail Clamps<br>Complete Intersection |
|  | Bucket Lips<br>Crusher Jaws<br>Dipper Teeth<br>Mixer Teeth<br>Special Trackwork | Crank Pins<br>Crank Shafts<br>Locomotive Frames<br>Rolls<br>Roll Shells |   |

This list is merely an indication

General Offices:

Transportation Building, Montreal



Cast Steel  
Stone Crusher Frame

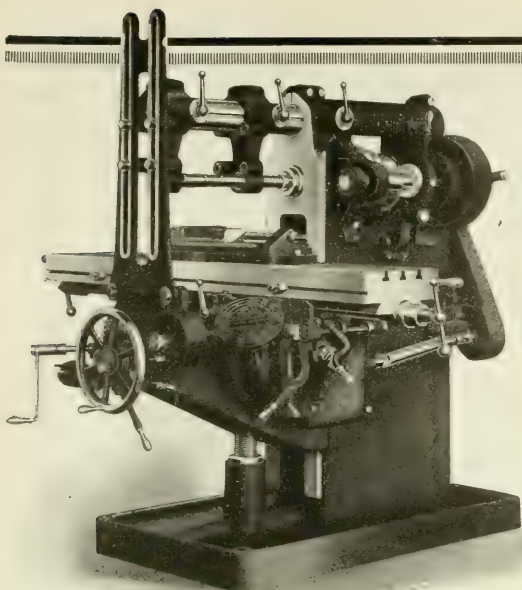
**Machinery Parts**  
of every description  
in  
**Cast Steel**

**Chrome-Nickel**  
and other forged gear blanks

**Forged Shafts**

**Dominion Foundries & Steel Limited**  
Hamilton, Canada





New Design No. 4 Plain Miller

**T**HERE is one thing you expect from every Miller or Disc Grinder purchased. That is **satisfaction**. You can get no more, for satisfaction is an incorporation of every desirable quality—accuracy, speed, dependability—everything that goes to make a profitable investment.

In buying Milling Machines or Disc Grinders bearing the Ford-Smith trademark you are assured of perfect satisfaction. Every Ford-Smith Machine is subjected to the most exacting tests before leaving the factory and is guaranteed to give the best of service. That's why there are so many in use.

**PUT** your milling and grinding problems before our engineering staff. Competent advice promptly furnished.

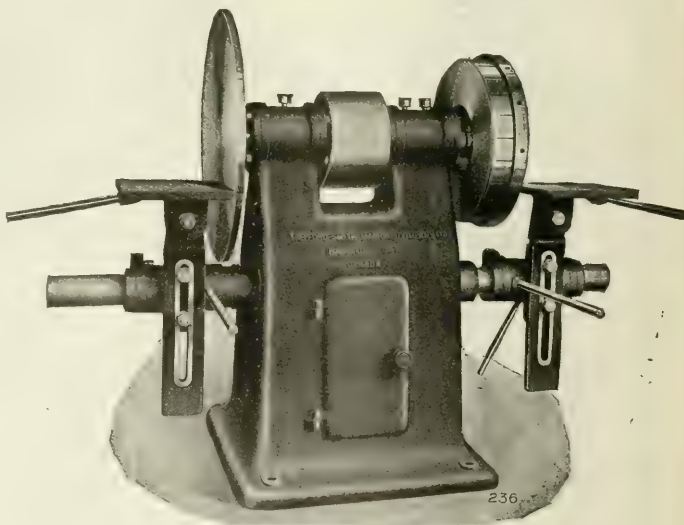
FOREIGN AGENTS:  
W. E. Storey, London, England  
McLeod & Co., Calcutta, India

## FORD-SMITH

### Milling Machines and Disc Grinders

Ford-Smith Milling Machines are correct in design, built to last and insure rapid, quality production. Look in any of the best shops. You'll find Ford-Smith Millers boosting production.

Ford-Smith Disc Grinders are an efficient link in lowering production costs. These dependable machines are almost indispensable for handling work that calls for machines of strength, accuracy and durability.



24-inch Grinder (Ball Bearing) with Ring Wheel Chuck

## THE FORD-SMITH MACHINE

Company, Limited

HAMILTON

ONTARIO

CANADA





## Wood-Working Machinery

*For Making Patterns Right*

Progressive firms find in the "Oliver" line of Saw Benches, Wood-Turning Lathes, Band Saws and Sanders the right kind of equipment for getting "quality work on time."



# "OLIVER"

## A Band Saw that has proved a big Production Booster



**T**HIS No. 16 Band Saw is a machine you can depend on to work all day and every day without coaxing and jockeying. It is a machine that has given satisfaction wherever used.

"Oliver Band Saws are strong, convenient, steady and safe. No. 16 is a medium size machine which carries 36-inch wheels, will take 18 inches under the guide and saw 36 inches between blade and column; tilts 45° to the right and 10° to the left.

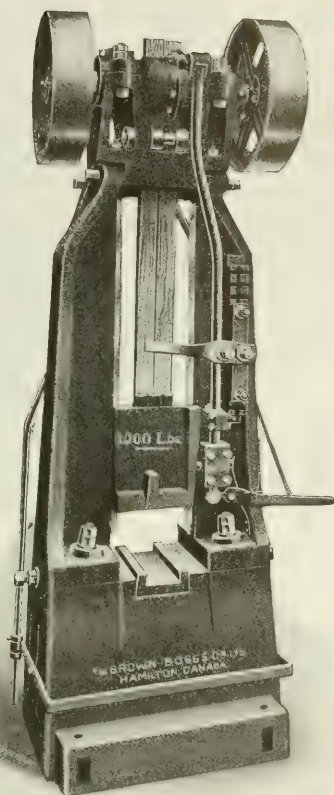
### The "Oliver" Universal Saw Bench

The upper illustration shows the "Oliver" Universal Saw Bench in operation. Designed to save lumber, this machine turned out a big time-saver as well. Well provided with safety guards that eliminate danger to the operator, it has been extensively installed and is always in demand.

Full description complete line of "Oliver" Woodworking Machines on request.

**OLIVER MACHINERY CO.**  
Grand Rapids, Michigan





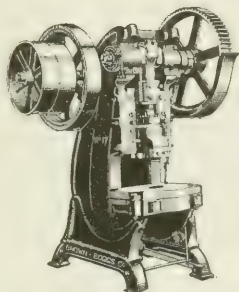
1,000-Lb. Board Lift Drop Hammer

# Bro *Sheet*

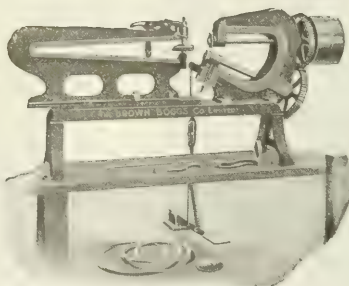


## A Complete Line

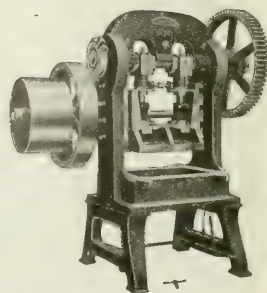
Tinsmiths' tools and sheet metal working machines of every description, also canners' and evaporators' machinery, shears of all kinds, power press for punching, forming, embossing, blanking, etc.



No. 17—Power Press



No. 36—Ring and Circular Shear



No. 20½—Power Press

# Brown-Boggs

## *Metal Workers' Tools*

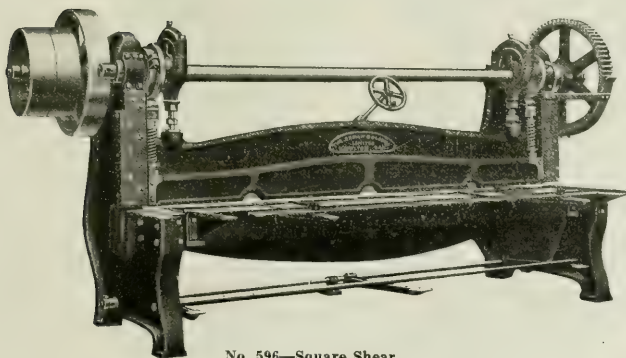
### Tools that Ensure Speed and Economy in Production

**P**RESENT day business and industrial conditions demand SPEED in production in practically all commodities. This is especially true with respect to those industries whose business is obtained upon a competitive basis. The tinsmith or sheet-metal worker who equips his plant with "B-B" tools is on safe ground. They are designed to save labor and speed up production—and are easy and convenient to operate; sure in their performance; sure of freedom from trouble; sure in every detail which makes for accurate and easy output of work.

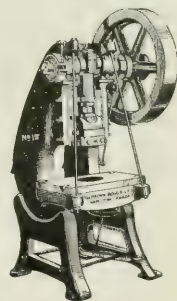
Let us know the machine you are interested in and complete information will be promptly supplied. If you wish advice consult us freely.

*Orders for Export Receive Careful Attention*

**The Brown, Boggs Co., Limited**  
**Hamilton, Canada**



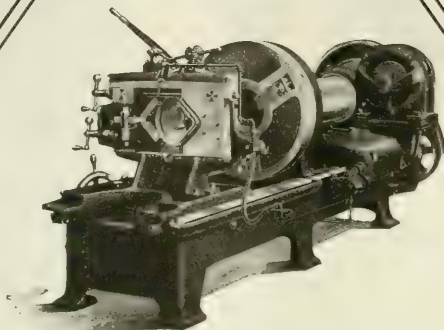
No. 596—Square Shear



No. 15—Power Press



# WILLIAMS



## PIPE MACHINES

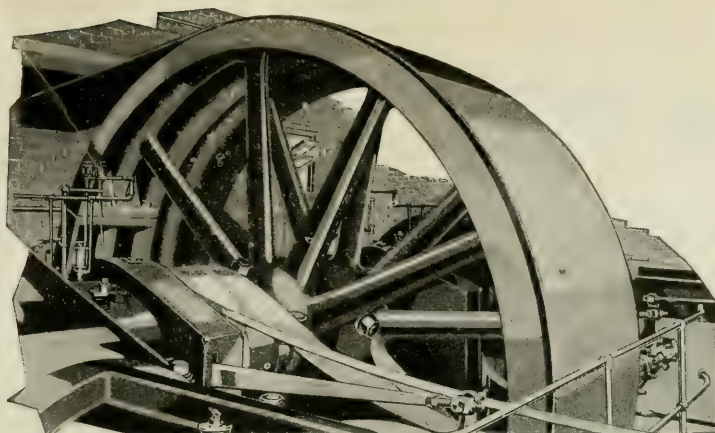
### *Outstanding Features:*

- |   |   |
|---|---|
| 1—Single Pulley Drive, through.                               | 6—Individual Adjustment for each bearing.     |
| 2—Dodge Friction Clutch, on machine.                          | 7—Large Spindle Bearings are ring oiling.     |
| 3—Clutch Lever at operator's left hand.                       | 8—Compact Control Levers on operator's side.  |
| 4—Rigid Bearing Bracket on drive shaft.                       | 9—Large Die Cabinet and Tool Tray.            |
| 5—Gear Box Drive away from operator.                          | 10—Substantial Oil Trough around top of ways. |
| 11—Specially constructed Reservoir and Filterer.              |   |
| 12—Low-down Sliding Head.                                     |   |
| 13—Rotary Geared Pump reversible for left-hand thread.        |   |
| 14—Specially designed Carriage to drain off oil and cuttings. |   |
| 15—All Gears amply protected.                                 |   |

*Send for Catalog of  
Various Styles*

**WILLIAMS TOOL CORPORATION**  
of Canada, Limited - Brantford, Ontario

Successors to  
**JOHN H. HALL & SONS, LIMITED**



## Inbuilt Belting Strength

Transmission troubles due to stretch and slipping are eliminated by Dominion Friction Surface Belting. "Plus Service" construction and exceptional pulley gripping power make it unrivalled for reliability and economy on all drives. Every Dominion Friction Surface Belt installed means so much more power conserved.

Without any obligation to you, our nearest Service Branch will send an experienced belting man to study your transmission requirements and submit recommendations for your approval.

## Dominion Rubber System Service Branches:

Halifax  
St. John  
Quebec  
Montreal

Ottawa  
Toronto  
Hamilton  
London

Kitchener  
North Bay  
Fort William  
Winnipeg

Brandon  
Regina  
Saskatoon  
Edmonton

Calgary  
Lethbridge  
Vancouver  
Victoria

## DOMINION RUBBER SYSTEM PRODUCTS

### Belting

Transmission: "Dominion," "Keewatin," "Para."  
Conveyor: "Rockproof," "Canadian," "Hiheat."  
Elevators: "Dominion," "Rockproof."  
Agricultural: "Dominion," "Star."  
Grain Elevator: "Metcalf Standard," "Grain King."

### Hose

Air: "Kushion Kover," "4810 Airtite," "Star."  
Steam: "Indestructible," "Rockproof," "Para."  
Water: "Indestructible," "Para," "Kushion Kover," "Star."  
Suction: "Para," "Star," "Trade."  
Garden: "Canadian," "Dominion."

### Packing

Sheet: "Join-Tite," "Star," "Importers."  
Rod: "Cabestos," "Valve-Bestos," "Canadian."  
Valves: "Montreal," "Commercial," "Canadian."

### Miscellaneous

Mats, Matting and Flooring.  
Moulded Goods.  
Plumbers' Specialties.  
Hard Rubber Goods, Tubing.  
Rubber Covered Rolls, Deckle Straps.  
Friction Tape, Splicing Compound.

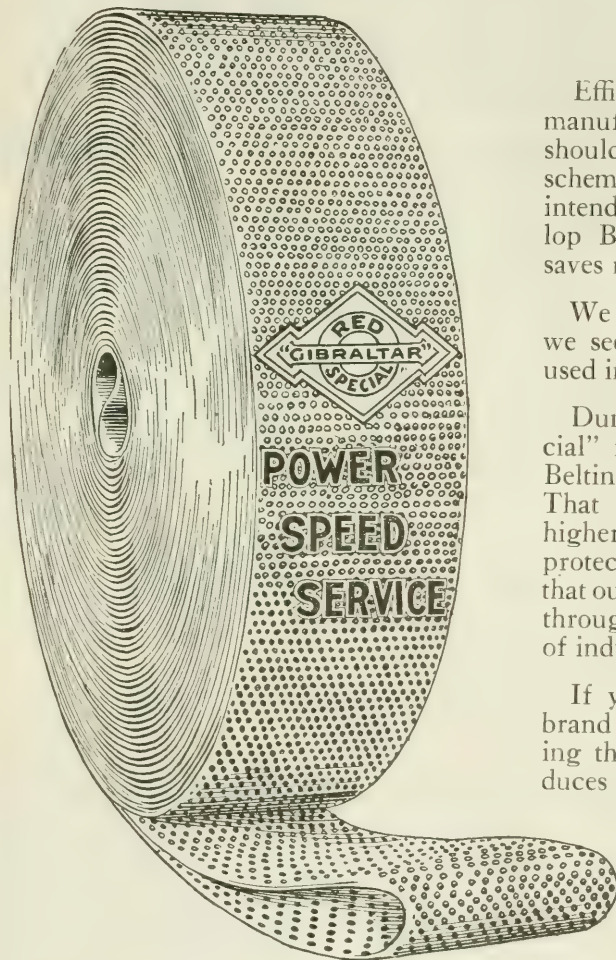




# DUNLOP

*Makes a Belt to Suit Your Every  
Need—*

*Economically and Efficiently*



Efficiency in a belt rests with its manufacturer, because no belt should be sold unless it fits into the scheme of things for which it was intended. That is where the Dunlop Belting Service Department saves money for Belt users.

We make Belts for every use, but we see that the proper belts are used in the proper places.

Dunlop "Gibraltar Red Special" is the standard in Dunlop Belting construction and quality. That standard is considerably higher than the average—for your protection. This Belt is proving that out on hundreds of hard drives throughout many different kinds of industries.

If you are not yet using this brand of belting you are not realizing the benefits such a belt produces for its user.

*The Dunlop Belting Service Department will be glad to discuss your belting problems with you, or a salesman will call when you say the word.*

## Dunlop Tire & Rubber Goods Co., Limited

Head Office and Factories: TORONTO

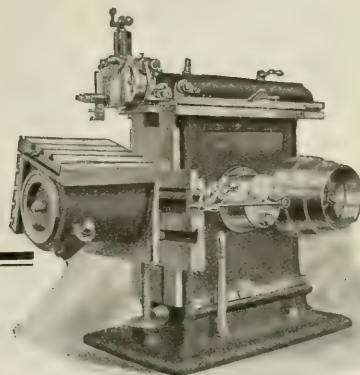
Branches in the Leading Cities

*If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.*

# UNIVERSAL

## SHAPING MACHINES

---



No special vises or fixtures needed; the Universal features of these machines take care of everything, making them particularly adapted to—

Die Work  
Tool Making and  
General Manufacturing.

Machines regularly furnished with—

Swivelling Graduated Table  
Auxiliary Tilting Side for Compound  
Angles

Power Down Feed on any angle, with any  
variation of feed

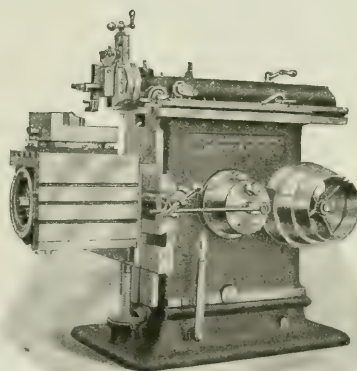
Automatic Feed Stop

Graduated Collars on Tool Head Feed  
Screw and Table Feed Screw

Swivel Vise and Graduated Base

Table raised and lowered by power on  
24-in. size.

We carry large stocks of  
our 15-inch and 24-inch  
shapers in our Toronto  
show rooms—all ready for  
immediate shipment.



*Canadian Offices:* POTTER & JOHNSTON MACHINE CO.

## ROELOFSON MACHINE & TOOL CO., LIMITED

*Head Office and Show Rooms:*

11 Wellington Street East - TORONTO, CANADA



# A Quick and Easy Means of Tapping Square or Hexagon Nuts

**M**ODERN manufacture and industrial readjustments demand a machine tool, which, besides being a high-speed producer, is capable of precision work under the most severe service.

Of such nature are Acme Nut-Tapping Machines. These easily-operated tools are limited to speed only by the endurance of the taps. For this reason Acme Machines most profitably meet to-day's demands.

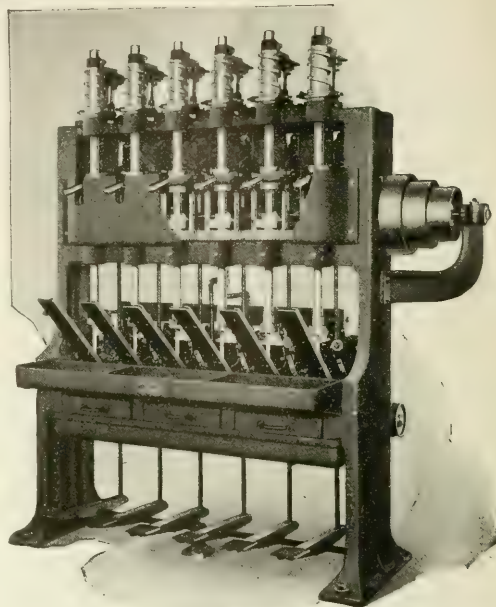
One plant has been using two Acme Tappers for eight years. They have subjected them to the most strenuous service, yet to-day each averages 10,000 threaded nuts per nine hour day with a spindle speed of 100 r.p.m., the limit of tap endurance on the tough material used.

This concrete example of Acme performance is being emulated in hundreds of other shops.

If you want, then, a convenient tool, a fast and accurate tool, a tool that will stand up indefinitely—look for the name "Acme."

In every respect Acme ability clearly reflects the years of building experience.

**Write for illustrated catalogue of Bolt, Nut, Rivet, Upsetting and Forging Machinery.**



## ACME Nut Tapping Machines

Acme Six-Spindle, Semi-Automatic Nut Tappers have many important features which facilitate operation and increase speed. Each spindle is equipped with automatic lifting device which permits automatic feed to place nut under tap. Every action has been carefully developed and proved correct in practice. Write for further details.

# The Acme Machinery Company

4530 St. Clair Avenue, Cleveland

Canadian Agents: The John Bertram & Sons Co., Limited, Dundas

# ROYLITE CLEANER

## Promotes Economy in Toronto Plant

**R**OYLITE cleans steel quicker, with less expense, and in every way gives better satisfaction than any other cleaner ever used. This is the experience of the Chapman Double Ball-Bearing Co., Limited, Toronto.

The illustration shown here is drawn from an actual photograph taken in the Chapman plant. The man in the picture is dipping Ford Front Wheel Axle Bearings in a vat of Roylite Cleaner. About 140 bearings are placed in each tray and then submerged in the boiling solution for three seconds only. When removed the bearings are thoroughly clean—the dirt and oil collected during assembling operations are entirely removed.

ONE OF THE CHIEF CHARACTERISTICS OF ROYLITE IS THAT IT PREVENTS RUST; it is the only cleaner yet tried out by this firm that gives entire satisfaction in this particular.

All exacting work of this nature is done in Roylite in the Chapman plant—distinctive proof of Roylite's efficiency.

We will send an expert with sample to your plant to give a free demonstration on request.

Try a Barrel of

**ROYLITE**

Lasts Longer---Works Quicker  
Costs Less

Manufactured by

**CANADIAN HANSON & VAN WINKLE CO. LTD.**  
TORONTO, ONTARIO

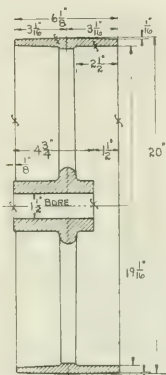
*A Canadian Product Manufactured by Canadian Workmen*

**CLEANS ALL METALS**





# STEINLE TURRET LATHES ON PULLEY PRODUCTION



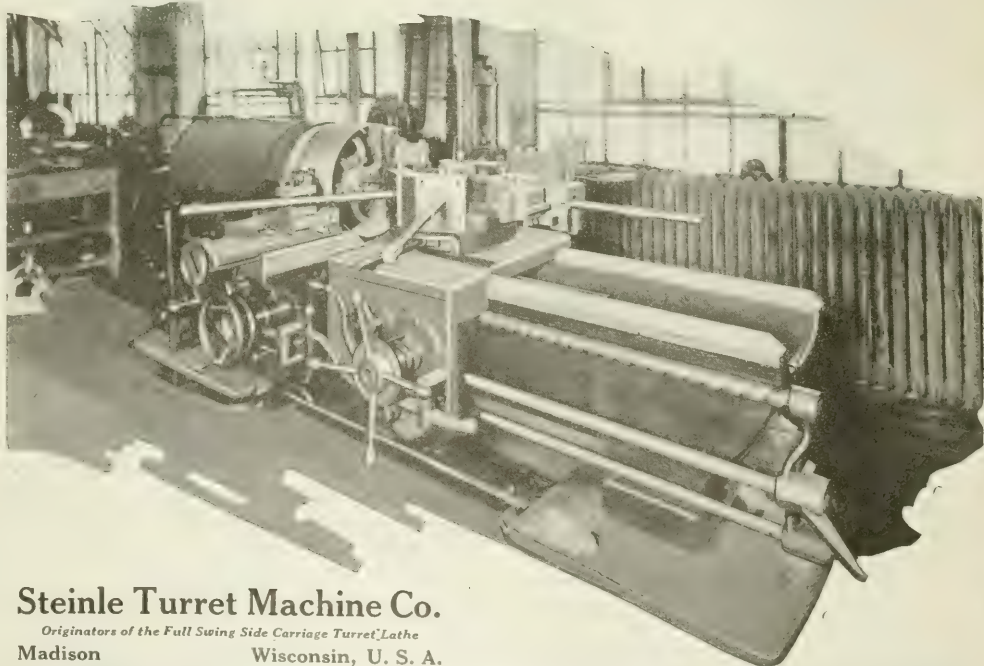
Material—Cast Iron.  
Finish—As Indicated.  
Time—20 minutes.

The Job  
and  
The Machine

The photograph below was taken in the plant of the J. G. Cherry Company, manufacturers of creamery and dairy machinery and supplies at Cedar Rapids, Iowa, and shows a 24-inch Steinle Full Swing Slide Carriage Turret Lathe turning out a 20-inch diameter crown face pulley. This is only one of many jobs produced with absolute satisfaction on this machine.

In view of present manufacturing conditions it is invariable performance that counts, and the Steinle qualities of accuracy, speed, ease of operation, power, reliability and economy of upkeep are guarantees of satisfactory performance on your own work.

*Why not send us your blueprints  
for our recommendations?*



## Steinle Turret Machine Co.

*Originators of the Full Swing Side Carriage Turret Lathe*

Madison

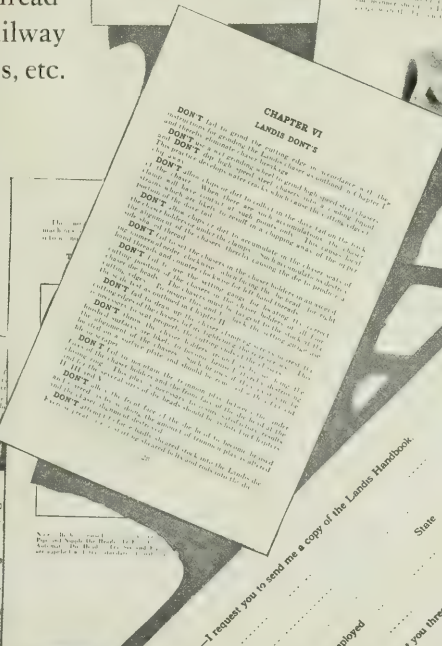
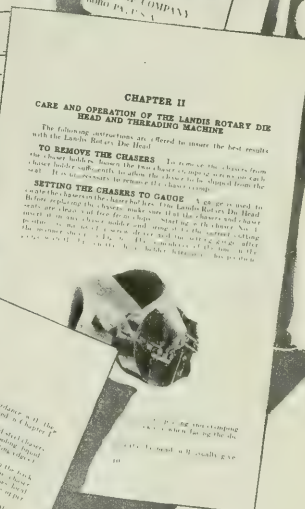
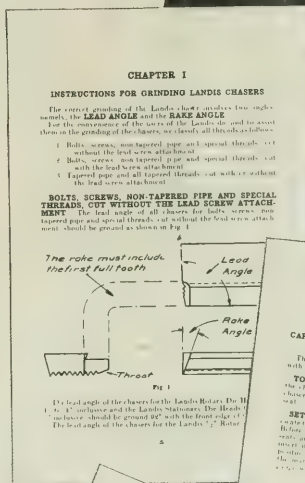
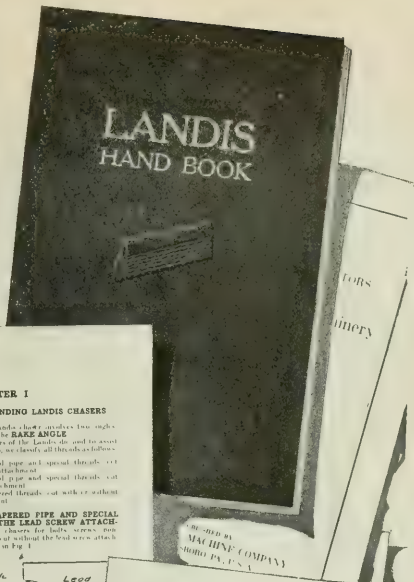
Wisconsin, U. S. A.

AGENTS: Machine Tool Engineering Company, Singer Building, New York City; Cadillac Tool Company, Dodge Power Building, Detroit, Michigan; L. G. Henes, 75 Fremont Street, San Francisco, California, and Tile Insurance Building, Los Angeles, California. FOREIGN—Leo. C. Steinle, 53 Victoria Street, London, England.

*If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.*

*Send for Your Copy To-day—  
It's FREE*

Waynesboro,  
Pennsylvania



Gentlemen:—I request you to send me a copy of the *Lands Handbook*.  
 Name ..... State .....  
 Street .....  
 City .....  
 By whom employed .....  
 Position .....  
 Mention what you thread on your Lands Equipment.  
 C.M.  
 6-52

C. M.  
6-5-21





# TOOLS

## The "Brain" Margin in Machine Tools

**Y**ES, Sir, it's the "brain" margin that makes or breaks a machine tool.

Why does one apparently good tool fail while another succeeds? Why does one speedily find its way to the scrap heap while another is a "production booster?"

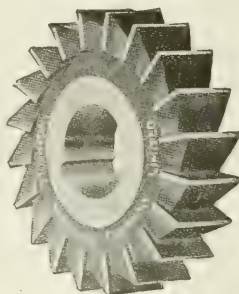
It's in the size of the "brain" margin; the knowing how that determines the extent of a tool's efficiency.

IMCO three and four lip drills, reamers, cutters, and mill ends are built by an organization which

spent years in "finding out." IMCO Tools cut more metal in less time; last longer; are more accurate, because of the extra margin that comes from "knowing how."

**When you want a precision tool choose "Imco." Imco reamers are milled twice as deep as ordinary reamers.**

The most complete of modern machine shop facilities enables us to expertly handle any kind of machine tool or machine construction. Consult us on your engineering problems.



## INGERSOLL MACHINE & TOOL COMPANY, LIMITED

INGERSOLL, ONTARIO

Toronto Branch--80 Bay Street; Phone Adelaide 7227

Chas. A. Strelinger Co., Ltd., Windsor, Ont.

Watt Machinery & Equipment Co., 344 St. James St., Montreal, Quebec.

# NAMCO COLLAPSING TAPS

*Rigidly Held Chasers*

*Positive Collapsing*

*Withdrawal of Tap without injuring threads*

*Positive Resetting*

THE NATIONAL ACME COMPANY  
CLEVELAND, OHIO

New England Pl. & Windsor, Vt.

Canadian Screw Plant, Montreal, P.Q.

*Branch Offices:*

NEW YORK BOSTON CHICAGO DETROIT BUFFALO  
WAREHOUSES NEW YORK and CHICAGO  
REPRESENTATIVES IN PRINCIPAL FOREIGN COUNTRIES

*Makers of Solidity Saws and Multiple Spindle Automates  
at Windsor, Vt. and Acme Automates Threading Dies, Col-  
lapsing Taps and Screw Machine Products at Cleveland, Ohio*





# MORSE CHAIN DRIVES

The Sign of Efficiency      The Sign of Durability

Positive as Gears      Flexible as a Belt

Longer Life

## A Preferred Investment

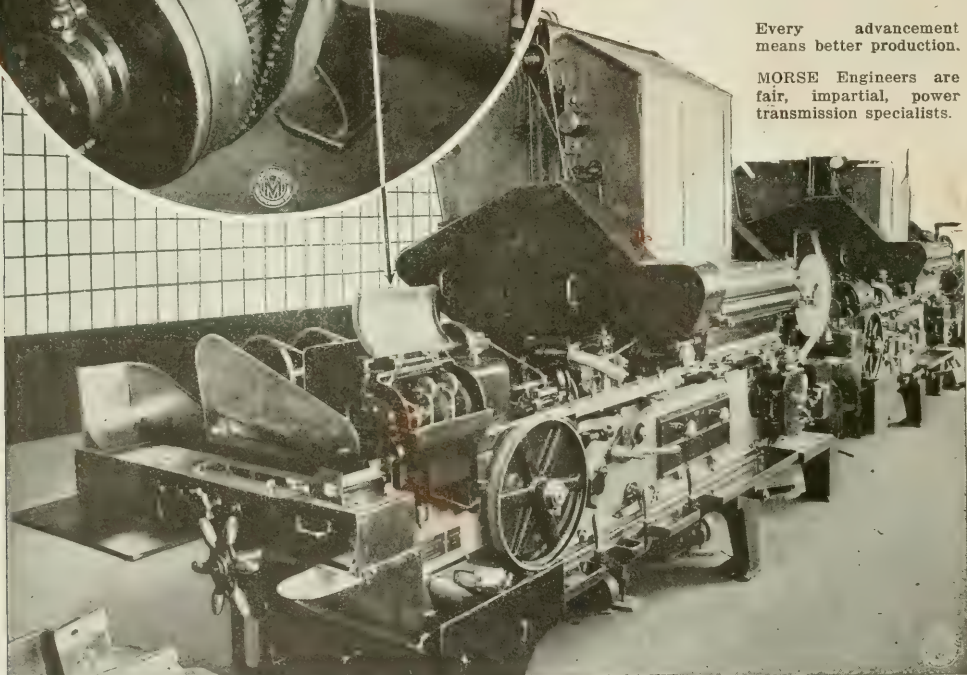
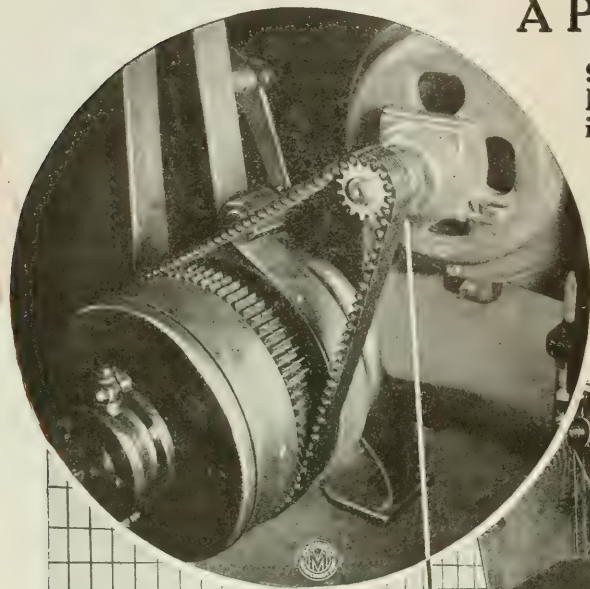
**99% Efficient, Positive Speed Ratios, Smooth Running producing 500 Cigarettes per Minute**

The American Machine & Foundry Company, to provide durability, continuity, low maintenance and least trouble—furnish Morse Silent Chain  $\frac{1}{2}$ " pitch,  $1\frac{1}{4}$ " wide, speed 750 f.p.m. for drive from 2 h.p. motor, 1200 r.p.m. to machine sprocket, 200 r.p.m. Think!! What would the least irregularity in driving mechanism mean at the speed necessary for above production?

Investigate! Noisy gears, slipping belts, profit losing, troublesome drives.

Every advancement means better production.

MORSE Engineers are fair, impartial, power transmission specialists.



**MORSE CHAIN CO.,**

Morse Engineering Service

LARGEST MANUFACTURERS OF  
SILENT CHAINS IN THE WORLD

**ITHACA, N. Y.**

Assistance Without Obligation

Write for Booklet

Address Nearest Office



ATLANTA, GA. 702 Candler Bldg., Earl F. Scott & Co.  
BALTIMORE, MD. 1402 Lexington Bldg.  
BOSTON, MASS. 131 Milk Street  
CHARLOTTE, N. C. 404 Commercial Bank Bldg.  
CHICAGO, ILL. Merchants L. & T. Bldg.  
CLEVELAND, OHIO Engineers Bldg.  
DETROIT, MICH. C. F. 8th and Abbott Sts.  
KANSAS CITY, MO. Francis Bldg., Morse Engr. Co.

MINNEAPOLIS, MINN. 413 3rd St. S. Strong-Scott Mfg. Co.  
CANADA Jones & Glasco, Reg'd  
MONTREAL St. Nicholas Bldg. Toronto, Traders' Bank Bldg.  
NEW YORK CITY 50 Church St.  
PHILADELPHIA 302 Harrison Bldg.  
PITTSBURGH, PA. Westinghouse Bldg.  
SAN FRANCISCO, CAL. Monadnock Bldg.  
ST. LOUIS, MO. Chemical Bldg. Morse Engineering Co.

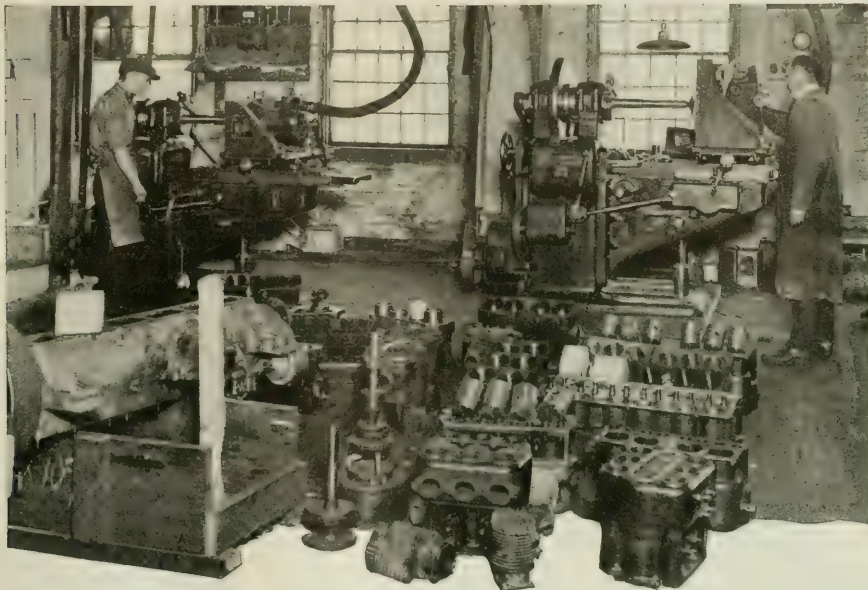


**"Morse" is the Guarantee Always Behind the Efficiency, Durability and Service**

If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.

HEALD

## Heald Employees Enter Regrinding Business



Cylinder regrinding corner at Ramsdell & Van Dyke's, Worcester, Mass. Two years ago they started on practically nothing. Now, six men are required to take care of the blocks that arrive each day.

A man that practices what he preaches, or a doctor that will take his own medicine, is usually thoroughly convinced of its advantages and merits.

So enthusiastic are the Heald employees over the possibilities and profits of cylinder regrinding that many have gone into the business themselves.

Above is the regrinding corner at Ramsdell & Van Dyke's shop in Worcester, Mass. Van Dyke was formerly demonstrator for The Heald Machine Company and started in two years ago with Ramsdell, who also worked at Heald's. "We had blocks ahead of us from the very first," is the way Van Dyke defines his business

that has grown by leaps and bounds in two years' time.

Just recently Oliver Johnson, demonstrator and salesman in the Chicago territory, has heard the call and gone into cylinder grinding.

These boys know the returns of shops equipped with Heald machines. They are getting into the game while the getting is good.

Since the first appearance of the self-contained Style No. 55 with its large capacity and wide range, its simplicity and moderate price, the whole Heald organization from the office boy to the general manager has been filled with enthusiasm over the possibilities of regrinding. Every employee is sold on the proposition.

Let us give you facts and figures on the possibilities and profits of regrinding. Wire, phone or write.

### The Heald Machine Company

51 New Bond St.

Worcester, Mass.





## Cutting Commercially Accurate Threads in Monel with GTD "Gun" Taps and "Acorn" Dies

**N**O ordinary tap or die can thread Monel metal—a fact which up to now has limited its use in many plants, where its great strength and non-corrosive properties would otherwise strongly recommend it.

The GTD staff, however, recently made a series of tests with Monel and to the great satisfaction of the officials of The International Nickel Company, who produce this popular metal, proved that it can be tapped and threaded to any degree of commercial accuracy required in spite of its toughness and ductility.

Instead of

- cutting over size —clogging
- breaking —dulling

the GTD "Gun" Taps did their work as cleanly and with as little difficulty as they would in steel, and when thread after thread had been cut with the chips shooting ahead, in true "Gun" Tap style, the threads were gaged—the first and last in each hole measuring to size without perceptible variation.

With samples of threaded Monel and a report of the tests before them, the International Nickel Company sent in this letter, which we are proud to quote:

"We have received and examined samples of Monel Metal threaded and tapped with your "Acorn" Die and "Gun" Tap. The fact that there are no indications of torn surfaces or of split threads is evidence of the efficiency of your tools.

"You are to be congratulated that so successful a piece of work could be done using your stock tools, and by operators unfamiliar with threading Monel Metal."

If you have a threading problem which involves Monel or any other metal, which has previously been difficult to thread, try the "Gun" Tap and "Acorn" Die—specially designed exclusive GTD products. Or if you wish the experimenting done for you, write us stating kind of metal used, or sending sample—and our engineering department will demonstrate quickly and thoroughly how the "Gun" Tap and "Acorn" Die work. We will be pleased to send you circulars descriptive of the "Gun" Tap and "Acorn" Die. Just fill out and mail the attached coupon.



Successors to Wells Bros. Co. of Canada, Ltd., Galt, Ontario

GTD Screw Plates, Taps, Dies, Reamers, Gages, Pipe Wrenches

GTD  
Corporation  
of Canada, Ltd.  
Galt, Ontario  
Send me circulars  
describing the "Gun"  
Tap and "Acorn" Die.

Name metals to be threaded

Name

Position

Firm or Company

Address

CM 200

# PARKER

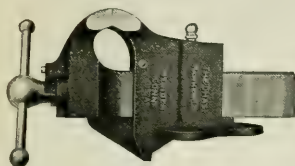
AMERICA'S OLDEST AND HIGHEST GRADE VISES

Pioneers in 1842—Leaders Ever Since

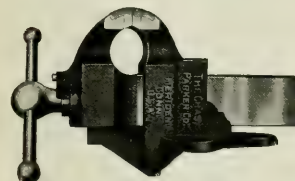
## THE PRODUCT OF MASTER MAKERS



PARKER SUPERIOR



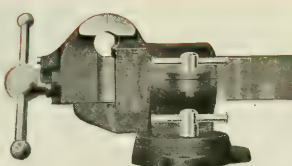
PARKER VICTOR



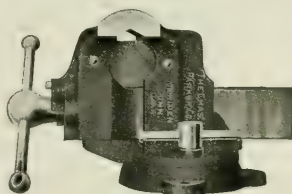
PARKER ECLIPSE

### *Reasons Why:*

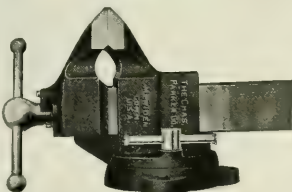
1. Semi-Steel Casting made in our own foundries.
2. Patented swivel base.
3. Solid Steel-Bar Slide Strengthened.
4. Renewable, milled and fitted tool steel jaws.
5. Saddle, taking up lost motion and allowing screw to be easily removed for lubrication, also making solid under portion to slide.
6. Set screw and spring tension in handle.
7. Extra strong screw and nut.



PARKER DOUBLE SWIVEL



PARKER PIPE



PARKER WOOD WORKER

BACKED BY 79 YEARS OF SATISFACTORY SERVICE  
STOCKS CARRIED BY LEADING CANADIAN JOBBERS

*Can You Afford to Be Without Them?*  
**THE CHARLES PARKER CO.**

Meriden, Conn.

*Master Vise Makers*

U. S. A.

*If interested tear out this page and place with letters to be answered.*



# Where failure of the smallest part may cause the greatest loss

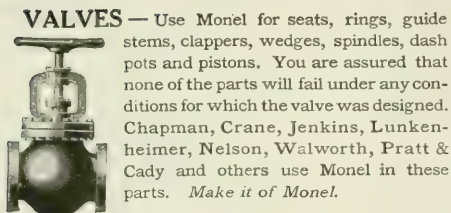


**W**HERE continuous service is necessary, but where acids, alkalis and steam tend to destroy, see that essential parts are made of Monel.

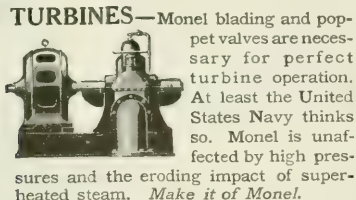
Where a part has failed due to a lack of strength, corrosion or rust—replace it with Monel.

Monel resists corrosive and erosive action, is as strong as steel and has practically steel's co-efficient of expansion. There are hundreds of places in your plant where Monel will save you money and uncertainty.

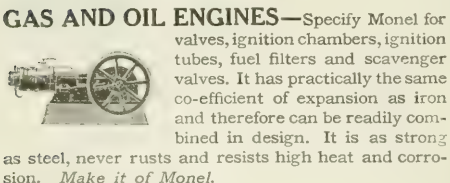
# Monel metal



**VALVES**—Use Monel for seats, rings, guide stems, clappers, wedges, spindles, dash pots and pistons. You are assured that none of the parts will fail under any conditions for which the valve was designed. Chapman, Crane, Jenkins, Lunkenheimer, Nelson, Walworth, Pratt & Cady and others use Monel in these parts. *Make it of Monel.*

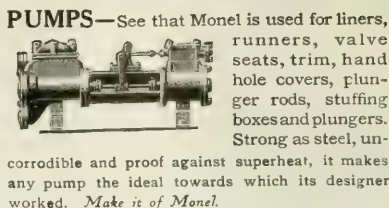


**TURBINES**—Monel blading and poppet valves are necessary for perfect turbine operation. At least the United States Navy thinks so. Monel is unaffected by high pressures and the eroding impact of superheated steam. *Make it of Monel.*

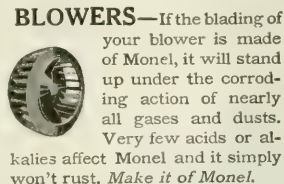


**GAS AND OIL ENGINES**—Specify Monel for valves, ignition chambers, ignition tubes, fuel filters and scavenger valves. It has practically the same co-efficient of expansion as iron and therefore can be readily combined in design. It is as strong as steel, never rusts and resists high heat and corrosion. *Make it of Monel.*

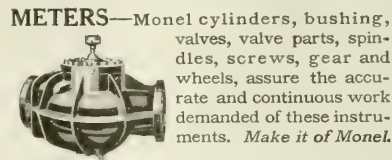
\*The name Monel identifies the natural nickel alloy—67% nickel, 28% copper and 5% other metals—produced by The International Nickel Company. Monel products include Monel blocks, Monel rods, Monel castings, Monel sheet, Monel wire, Monel strip stock, etc.



**PUMPS**—See that Monel is used for liners, runners, valve seats, trim, hand hole covers, plunger rods, stuffing boxes and plungers. Strong as steel, uncorrodible and proof against superheat, it makes any pump the ideal towards which its designer worked. *Make it of Monel.*



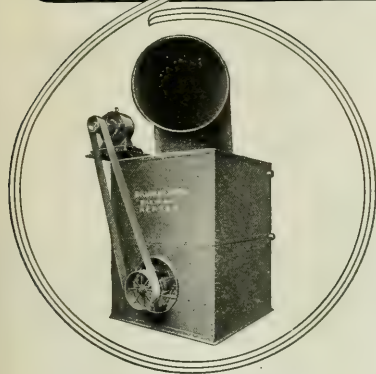
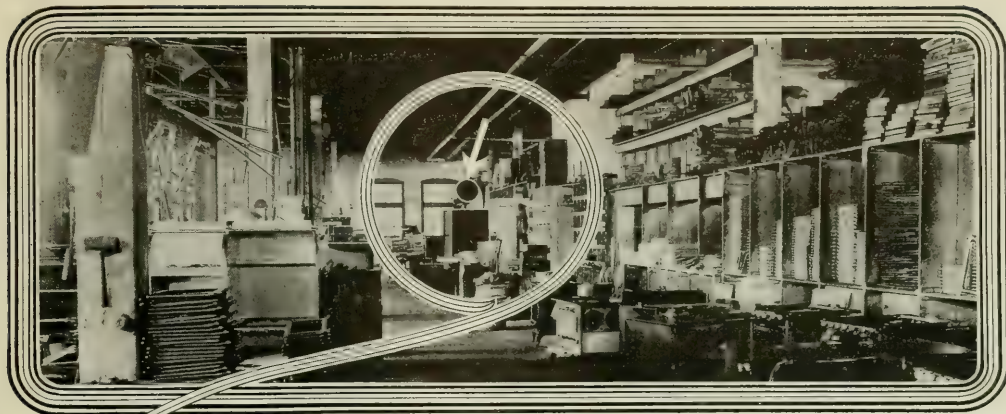
**BLOWERS**—If the blading of your blower is made of Monel, it will stand up under the corroding action of nearly all gases and dusts. Very few acids or alkalis affect Monel and it simply won't rust. *Make it of Monel.*



**METERS**—Monel cylinders, bushing, valves, valve parts, spindles, screws, gear and wheels, assure the accurate and continuous work demanded of these instruments. *Make it of Monel.*

**The International Nickel Company of Canada, Limited**  
Harbor Commission Building  
Toronto Ontario

Producers of METALLIC NICKEL in the forms of Ingot, Shot, Electrolytic Cathodes—99.8-10% Malleable Nickel, NICKEL SALTS, Oxides, Carbonates, Sulphates, Sulphides, Acetates, Formates—MONEL METAL, Ingot, Shot, Blocks.



### Mechanical Details

Built as an individual enclosed unit with a series of pipe coils compactly mounted above a powerful fan-wheel. Coils are heated by exhaust or live steam. Cold air is drawn into the heater by the fan, impelled upward and around the coils, and, after being heated, is diffused through outlet hoods to every part of the open area. No pipes or ducts used. The fan is operated by any power available.



### Direct-Fired Type

Where steam is not available, we supply our direct-fired type DF, which burns coal, coke or wood. Built on the same scientific principle as type SC. The fan is operated by any power available.

## Why Heat Your Factory Only in Spots?

The Skinner Bros. (Baetz Patent) Heating System will heat all of the open space in your factory all of the time—there will be no places continually too warm while others are too cold, as is usually the case with old-time heating systems.

### Simple and Economical

Skinner Bros. (Baetz Patent) Heaters operate without outside pipes or ducts. They are portable and require no foundations—cost of installation is 15% to 50% less than any other system—operating cost is equally low. The mild, constant circulation of warm air does not cause drafts or air blasts, raise floor dust or create other conditions injurious to the health of employees.

### Get Further Details

The principle of operation of Skinner Bros. (Baetz Patent) Heaters is briefly described at the left. Performance is guaranteed on a strictly money-refund basis. Complete detailed information and list of users will be sent on request. Please use the coupon.

### Skinner Bros. Mfg. Co., Inc.

1438 South Vandeventer Ave.

St. Louis, Mo.

Boston.....449 Little Bldg.  
Buffalo.....706 Morgan Bldg.  
Cleveland.....616 Marshall Bldg.  
Minneapolis.....806 Metropolitan Life Bldg.

Chicago.....1508 Fisher Bldg.  
Indianapolis.....330 Occidental Bldg.  
New York.....1706 Flatiron Bldg.

# Skinner Bros.

**Baetz Patent HEATING SYSTEM**

Skinner Bros. Mfg. Co., Inc.  
1438 S. Vandeventer Avenue, St. Louis, Mo.  
Please send complete details on Skinner Bros. (Baetz Patent) Heaters to  
Firm .....  
Address .....  
Building used for.....  
We can .....  
cannot use steam.



THE "DAVON" PATENT

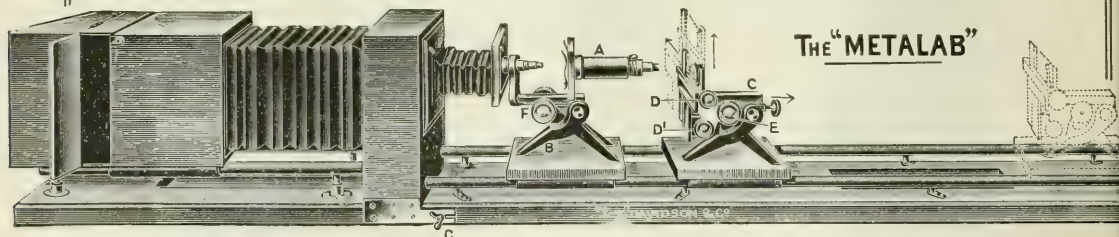
# MICRO-TELESCOPE AND SUPER-MICROSCOPE

Combining the functions of the Microscope, Telescope, Camera, and Projection Lantern for Industrial, Laboratory, and Educational Purposes.

A NEW FIELD OF OBSERVATION IS OPENED UP  
The Gap Between the Microscope and Telescope is Bridged.

## For Observation & Photography of Metal Fractures, Minerals, &c.

WITH LARGE "FIELD," LONG WORKING DISTANCE AND GREAT "DEPTH OF FOCUS"



OPTICAL BENCH (5 ft. 3 in. long). Half-plate Camera. Mirror Focussing Box. Travelling Mechanical Stage, Coarse and Fine Focussing (C), Vertical Illuminator, 4 in., 1½ in., 1 in., 2-3 in., 1-6 in., and 1-12 in. in immersion. "DAVON" Photo-Micro Objectives, "DAVON" Pat. Super-Microscope and Short Focus attachments, etc. Camera detachable. Body tube of Microscope to be replaced for observation.

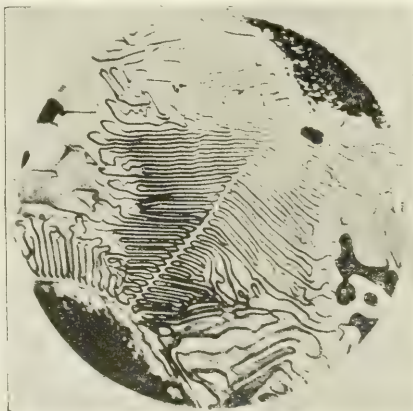
### METALLOGRAPHY FROM LIFE SIZE TO 1500 DIAMETERS

VISUALLY Mag. x 50, working distance 18 in., field ½ in. Mag. x 180, working distance 2 in. Mag. x 1500, working distance ¼ in. are striking characteristics.

PRICE COMPLETE £108 12s. 6d. Packing, Freight and Insurance Free to Port

Specimen  
Photographed on  
THE "METALAB."

HIGH SPEED  
STEEL  
AS CAST.  
Mag. x 1400.  
Objectives 1-12" and 1".  
Exposure 70 seconds.  
500 c.p. Arc Light.



No long extension camera  
is necessary.

Focussing is simplified by  
manipulating the mechanism E, D, D1 and C, while  
watching the image forming  
on the mirror through  
the door at the side.

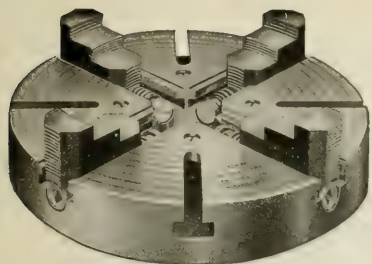
More than one observer  
can watch the operation.

DESCRIPTIVE  
PAMPHLET  
POST FREE

M385

F. DAVIDSON & CO., *Manufacturing Opticians*

29, GREAT PORTLAND STREET,  
LONDON, W., I. ENG.



We make a complete line of steel chucks, including **Geared Scroll Chucks and the Geared Scroll Combination.** These types are conceded to be unparalleled for heavy work and hard usage. Write for our illustrated catalogue.

## ALL STEEL INDEPENDENT CHUCKS

will put your work on new standards for accuracy and fast production. Independent Chucks are built for abnormally hard wear—the kind of usage that calls for great strength and long wearing qualities. Independent All Steel Chucks have proven so satisfactory that they are almost a necessity wherever high-speed cutting tools are used.

**UNION MANUFACTURING CO.**

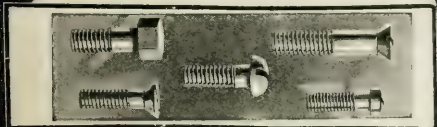
**New Britain, Conn.**

**New York Office: 26 Cortlandt St.**

*Makers of a complete line of Chucks*

## Wood Screw Making Machinery

SEND FOR CATALOGUE  
Series



For sixty years we have constantly manufactured machinery for making screws, always studying to improve and refine our product.

**Write or Wire us.**

Cable address: "Cook,"  
Hartford, U.S.A.  
Codes: Liebers

Western Union

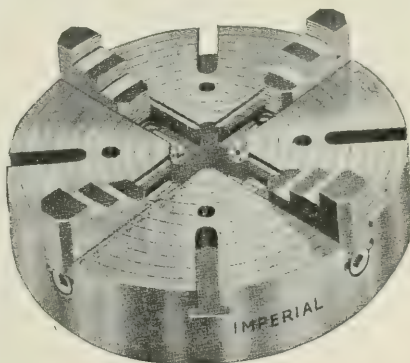
**Asa S. Cook Co.**  
**Hartford, Conn.**

## IMPERIAL LATHE CHUCKS

 *Highly Endorsed by Canada's Best Manufacturers*

Sturdy long-wearing "Made-in-Canada" Chucks that are making good everywhere.

Specify them in your next order.



**Ker & Goodwin Machinery Co.**  
**BRANTFORD, Ont. LIMITED**



## CHROME VANADIUM STEEL

for

*HEAVY DUTY*

*MACHINE WORK*

Chrome Vanadium Steel in its various carbon ranges is one of the most widely adaptable of Alloy Steels, and possesses remarkable characteristics.

Its high tensile strength and elastic limit, together with its excellent dynamic quality (resistant to fatigue), workableness and susceptibility to heat treatment, make it an ideal steel for use in the construction of heavy duty machinery.

In Pistons—Forging Hammer Rods—Gas Engine Parts—  
Foundation Bolts—Gears—Shafts—

wherever strength, ductility, life and safety are essential, Chrome Vanadium Steel will fill the requirements.

Chrome Vanadium is only one of the many Alloy Steels which we have assisted in developing. We supply it rolled into bars, billets and slabs, and our Metallurgical and Engineering Departments co-operate with the users on its proper application and working.

---

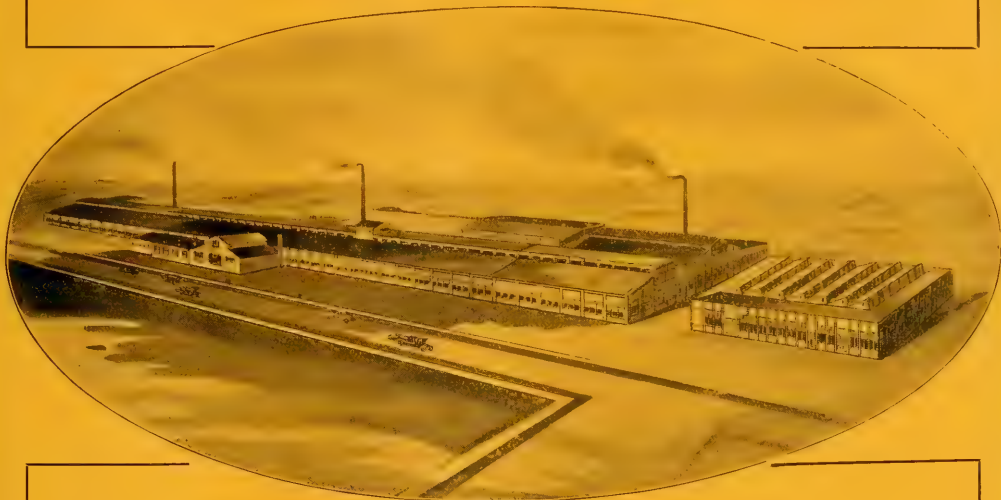
UNITED ALLOY STEEL CORPORATION  
CANTON, OHIO

Detroit  
Syracuse  
Cleveland

Dayton  
New York  
Indianapolis

Chicago  
San Francisco  
Portland

**INTERNATIONAL MALLEABLE IRON CO., LIMITED**  
GUELPH, ONTARIO, CANADA



## Malleable and Cast Iron PIPE FITTINGS

**Made in  
Canada  
and  
Exported  
Abroad**



A LARGE plant, up-to-date facilities and thoroughly experienced staff place us in a position to offer unequalled quality, price and quick delivery on Malleable and Cast Iron Pipe Fittings; both screwed or flanged, black or galvanized. All sizes from  $\frac{1}{8}$  inch up.

We make a specialty of exporting our products and can furnish designs required in any country, such as the Whitworth or "V" thread in use in England, the Metric Pitch in France, or the W. S. Standard in use in Canada and United States.

We will be glad to answer your enquiries.

**International Malleable Iron Co.**  
Limited  
GUELPH, ONTARIO, CANADA





## *Clothed in Robes of Authority*

**A** JUDGE is an authority on law. On the bench attired in his judicial robes and other accoutrements of his high office he is clothed in an atmosphere of authority—an authority that is held in high esteem.

Your advertisement in the pages of a **high-class** technical newspaper is like the judge on the bench. It, too, is clothed in robes of authority—robes of technical authority. It, too, is esteemed accordingly.

The **high-class** technical newspaper is edited by an authoritative staff of technical writers.

Their views are read and accepted by proprietors, executives and buyers of machine, power plant and industrial equipment.

A technical advertisement in a **high-class** technical paper thus finds its natural environment—where it will be fully appreciated and assimilated.

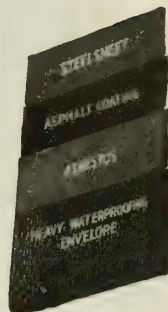
Your guide to a **high-class** technical newspaper is found in the Canadian National Newspapers and Periodicals Association. Every member in this association is pledged to an editorial policy of unimpeachable character, in addition to a plain, proven statement of circulation.

It is a fact worthy of note that the "big four" of the technical field of Canada are members of the C.N.N. & P.A.:

CANADIAN MACHINERY  
POWER HOUSE  
CANADIAN FOUNDRYMAN  
MARINE ENGINEERING

Complete information regarding this well-known group of technical papers may be obtained on application at the office of the Association, 70 Lombard St., Toronto. You are invited to ask questions.

**The MacLean Publishing Co., Limited**  
153 University Avenue, Toronto  
*Eight Branch Offices*



**Asphalt**—Asphalt is used for the first coating. Experiments have proved it the best protector of steel against corrosion.

**Asbestos**—Asbestos felt also completely covers the steel. It cannot rot or decay. Acids and alkalis do not affect it.

**Waterproofing**—The third coating is a weather resisting and chemically inert compound. It reinforces and multiplies the durability of the finished product.

## Permanently Replaced without Plant Interruption

Your roof can be both *permanently* and *quickly* replaced with Robertson Process Metal. It can be so easily accomplished that your plant operation need not be interrupted. You will have a more substantial roof and in addition to longer life you will have the advantage of greater insulation properties which will keep the building cooler in summer and warmer in winter.

Your present need for greater economy in maintenance and repair expense is fully met by this enduring Robertson Product. Nothing shows this quite so convincingly as the examination of a sample of Robertson Process Metal.

We have a process sample ready for immediate mailing. It will show you how the steel sheets are hermetically sealed and how both surfaces and edges

are completely encased by the three impervious coatings (1) Asphalt (2) Asbestos (3) Waterproofing.

Robertson Process Metal is made in corrugated, flat and mansard sheets for roofing and siding. It is also built into trim, flashing, gutters, downspouts and ventilators. Send for the process sample today and let us send you detailed literature.

H. H. ROBERTSON COMPANY, Limited, Sarnia, Ontario

Sales Offices: Drummond Building, Montreal, and Kent Building, Toronto

Agencies: Canadian Asbestos Co., Montreal and Toronto; Jamieson Engineering Co., Ltd., London Building,

Vancouver; R. Y. Kilvert & Co., Builders Exchange Building, Winnipeg; Gandy & Allison, No. 3 North

Wharf, St. John, N. B.; General Sales & Engineering Co., Metropole Building, Halifax, N. S.;

James E. Crawford, St. John's, Newfoundland

# ROBERTSON

## PROCESS METAL

FOR PERMANENT ROOFS, SIDING AND TRIM

TRADE MARK REG. U. S. PAT. OFF.

If interested tear out this page and place with letters to be answered.



# SAVE POWER!

OTHER things being equal, those machines which show the biggest saving in power are the ones **you** desire to use.

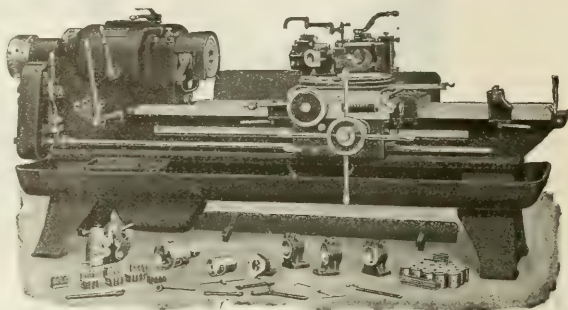
Cincinnati Acme Flat Turret Lathes are Economy Production Tools.

And when you consider that the Cincinnati is fast, accurate, reliable, that it does both bar and chuck work with equal efficiency, isn't it worth while getting the facts?

Our catalogue giving complete information will be forwarded on request.

## The Cincinnati Acme

Line of Flat Turret Lathes and Screw Machines are designed on the most modern principles. The head is cast solid with the bed. This gives constant, true alignment of the spindle with vee upon which the turret carriage travels.

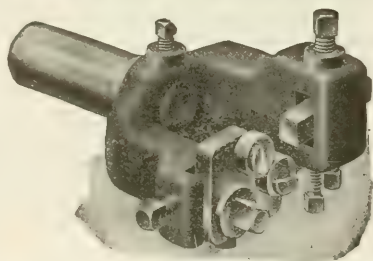


## THE ACME MACHINE TOOL COMPANY

CINCINNATI, OHIO, U.S.A.

Canadian Agents: Rudel-Belnap Machinery Company of TORONTO AND MONTREAL

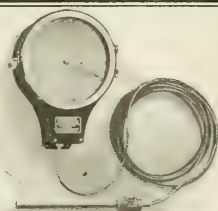
## TURRET-LATHE TOOLS & HOLDERS



COMPLETE EQUIPMENT FOR CAPSTAN  
LATHES FULLY ILLUSTRATED  
IN OUR TOOL LIST E.

Sales Agents Wanted

**J. ACKWORTHIE LTD.**  
COLESHILL STREET,  
BIRMINGHAM  
ENGLAND



## "The Recording Instrument Idea"

is strongly fixed in the minds of thousands of manufacturing executives. They appreciate the value of keeping in touch with operating conditions, and knowing what transpires during their absence, by means of the chart records furnished by

DE HARM  
**BRISTOL'S**  
U.S. PAT. OFFICE

## RECORDING INSTRUMENTS

Yet, the more important function of "The Recorder" is for the workman who is responsible for the quality of the product. With a "Recorder" installed on the job he can tell at a glance just what conditions are now, what they have been, and in what direction they are leading. With this knowledge he can readily obtain close regulation—and even inexperienced workmen can do better work.

CONTROL THE QUALITY BY  
CONTROLLING CONDITIONS

Get Copy of Bulletin I-103

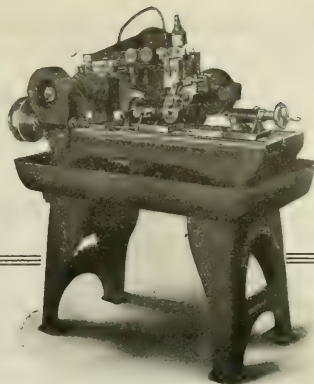
## THE BRISTOL COMPANY

WATERBURY, CONN.

Canadian Distributor: A. H. WINTER JOYNER, Toronto and Montreal

# Bilton

## GEAR MILLERS



### Add Hours to Your Working Day

By turning out more pieces per minute and speedily adapting itself to a wide range of special milling operations, the Bilton Gear Miller extends the limit of your day's output.

The Bilton easily and accurately produces plain and form milling as well as serrating, notching, slotting, fluting, etc.

The Bilton will prove a big factor in meeting coming competitive prices.

Send us blueprints, drawings or machinery instructions and we will give you Bilton time on YOUR product.



### Bilton Machine Tool Company

Bridgeport, Conn., U.S.A.

FOREIGN AGENTS:

Chas. Churchill & Co., Ltd.

M. Mett Engineering Co.

Alfred Herbert Ltd.

## REAL FIRE BRICK SERVICE

When you buy Elk Fire Brick we sell you a brand with the qualifications equal to the duty for which it is intended. We do not recommend the best quality brick for a certain job if a lower-priced brand will stand up just as well. Each brand of

## ELK FIRE BRICK

has some particular qualification which fits it to give better results in certain places than other brands we produce.

### OUR BRANDS:

|                 |                 |
|-----------------|-----------------|
| "Elkeo"         | "Keystone"      |
| "Elkeo" Special | "M.D. Elk"      |
| "Elk Steel"     | "Rotex"         |
| "St. Marys"     | "Elk Dust"      |
|                 | "Keystone Dust" |
|                 | "Rotex Dust"    |

Try us on your next fire brick needs. You'll find both our quality and service right.

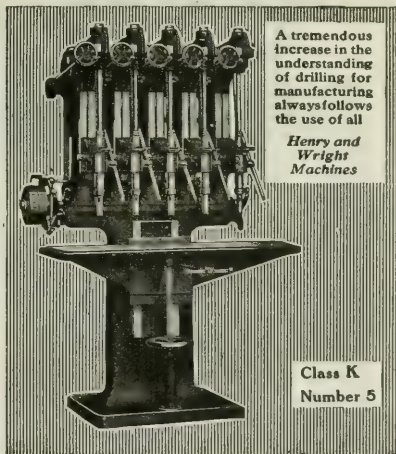
Large stocks on various shapes carried in warehouse in Hamilton.

**ELK FIRE BRICK CO. OF CANADA**  
LIMITED

Sun Life Building, HAMILTON, ONTARIO

## HENRY & WRIGHT

### Drilling Machines



A tremendous increase in the understanding of drilling for manufacturing always follows the use of all

Henry and Wright Machines

Class K  
Number 5

**The Henry & Wright Mfg. Co.**

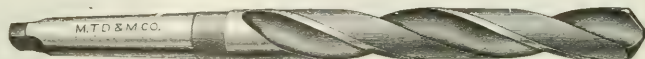
Hartford, Conn.

New York Office: 136 Cedar Street

Canadian Fairbanks-Morse Co., Montreal, Toronto, Winnipeg;  
A. R. Williams Machinery Co., Toronto, St. John, N.B.; H. W. Petrie, Ltd., Toronto; Williams & Wilson, Montreal; Rudel-Belnap Machinery Co., Montreal; Canada Machinery Corp., Galt, Ont.; Geo. F. Foss Machinery & Supply Co., Montreal; General Supply Co., Montreal.



**Everybody is preparing for  
BIGGER BUSINESS and the  
manufacturers must increase  
their output'**

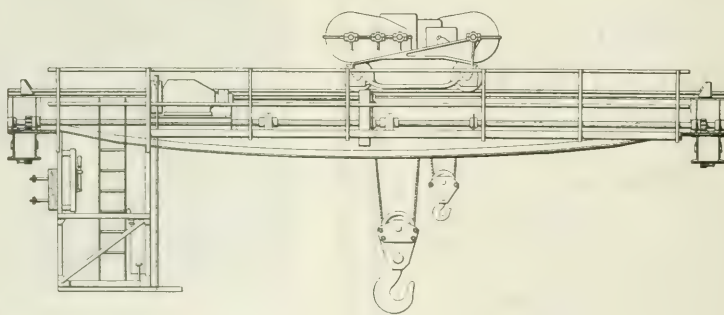


**Because of their Absolute Reliability  
"MORSE" DRILLS  
will prove a valuable aid in  
this direction.**

**Morse Twist Drill & Machine Co.  
New Bedford, Mass., U.S.A.**

# **CRANES**

**ELECTRIC AND HAND OPERATED**



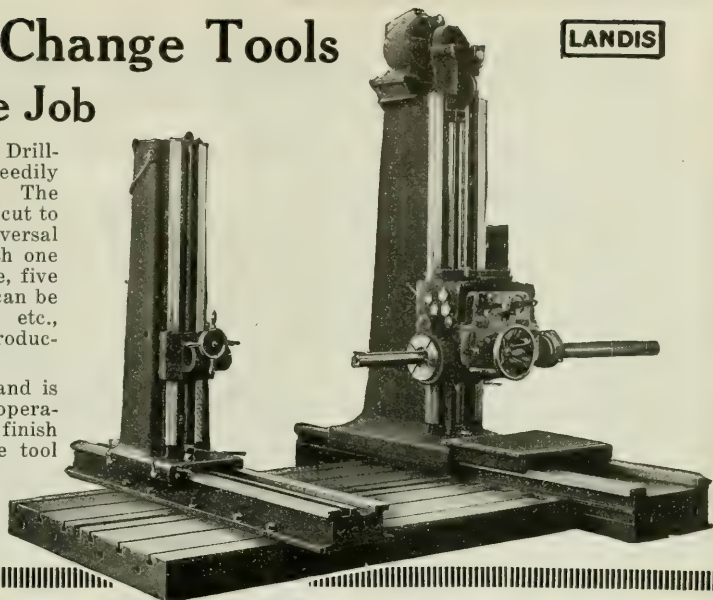
**DOMINION BRIDGE COMPANY LIMITED**  
HEAD OFFICE & WORKS: MONTREAL    BRANCHES:- OTTAWA, TORONTO, WINNIPEG

# It's Easier to Change Tools Than to Shift the Job

The Landis Boring, Milling and Drilling Machine accurately and speedily machines the heaviest castings. The usual expense of set-up time is "cut to the quick" by the use of the Universal Tilting and Rotary Table. With one set up of the work on this table, five sides or any angle of the piece can be bored, milled, drilled, tapped, etc., making a decided cut in non-productive time.

The Landis is a powerful tool and is highly adaptable to scores of operations. Its design, material and finish all show perfection in machine tool construction.

*The full information  
comes on request*



**LANDIS**

## LANDIS TOOL COMPANY

WAYNESBORO, PA.

New York Office: 51 CHAMBERS ST.

CANADIAN MADE

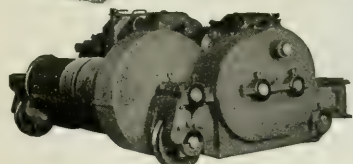
## Electric and Hand Traveling Cranes

CANADIAN MADE



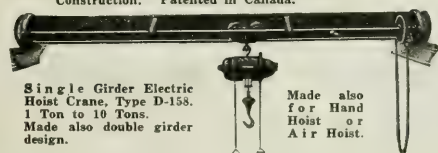
Type E—3-Motor Electric

Traveling Crane, 2 Tons to 100 Tons.



Northern Type E Crane Trolley, Rigid, Enclosed Construction. Patented in Canada.

We make a wide range of CRANE and HOIST designs. All sizes and capacities, 1 ton to 100 tons.



Single Girder Electric Hoist Crane, Type D-158. 1 Ton to 10 Tons. Made also double girder design.

Made also for Hand Hoist or Air Hoist.

Get our prices and specifications before you buy.

In asking prices, state SERVICE CAPACITY, SIZE OR SPAN POWER, and, if electric, KIND OF CURRENT.

Catalogs free.



Type D Electric Hoists— $\frac{1}{2}$  to 10 Tons.  
Air Hoists, Trolleys and Tracks



Type No. 20  
Air Hoists.

### Northern Crane Works, Limited

Walkerville, Ontario, Canada



# Gear Cutting With the "IFS" Left Out

## The Gear Shaper Way

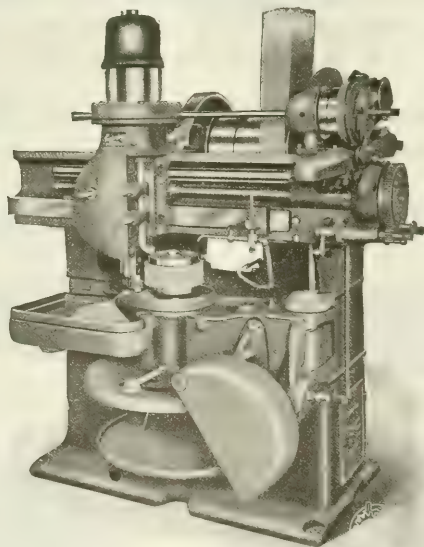
A production manufacturer knows that he will secure good gears IF he has an accurate cutter, an accurate machine and a machine working on the correct principle. The whole question of good gears is resolved in this one little word "IF."

When the Gear Shaper was originally designed, the question of "IF" was taken into consideration and every possible means known to mechanical engineering was employed to eliminate the "IFS" from gear cutting.

That we have been successful in solving the problem is evidenced by the fact that each ensuing year sees a larger number of manufacturers adopting the Gear Shaper method.

How the Gear Shaper has accomplished this is clearly explained in our general catalog "Commercial Gear Cutting," which is a treatise on the subject of:—  
Gear Cutting with the "IFS" Left Out.

**Send for your copy to-day.**



The Fellows Gear Shaper—the machine which has taken the "IFS" out of gear cutting.

## The Fellows Gear Shaper Company

### Springfield, Vermont, U.S.A.

FOREIGN AGENTS:—Alfred Herbert, Limited, Coventry, England; Societe Anonyme Alfred Herbert, Paris, France; Societa Anonima Italiana Alfred Herbert, Milan, Italy; Alfred Herbert, Limited, Yokohama, Japan; Societe Anonyme Alfred Herbert, Barcelona, Spain; Societe Anonyme Belge Alfred Herbert, Brussels, Belgium; Alfred Herbert (India), Limited, Calcutta, India.

*If interested tear out this page and place with letters to be answered.*



## His Work Guide is a PHOTOSTAT Print

(REG. U.S. PAT. OFF.)

### *Speed Up Your Production Too*

The whole world sorely needs every helpful effort.

This machinist is working from a Photostat print made direct from a pencil sketch.

Hours and often days are thus saved in putting work into and through the shop.

In the office, too, the Photostat is invaluable because it makes facsimile copies of blue prints, maps, charts, progress sheets, sales sheets, advertising layouts, etc.

Send for our booklet in which some of our customers tell in their own way how the Photostat is used both for standard and special work.

The Photostat is made by the Eastman Kodak Co., exclusively for the

**Photostat Corporation, Rochester, N.Y.**

Boston

Chicago

New York City

Philadelphia

San Francisco

Washington

EXECUTIVE OFFICE: PROVIDENCE, R. I.

# PHOTOSTAT

*If interested tear out this page and place with letters to be answered.*



## LA SALLE

**Has an Advantage  
Over Other Grinders**

There is some outstanding feature of all La Salle Grinding Machines that lends it exceptional productive ability.

The American Drill Grinder is especially adaptable for grinding twist, flat and three-flipped drills, because it has automatic lip rest and caliper jaw device, which assures proper clearance on all sizes of drills automatically. Send for descriptive matter covering our entire line of grinding machinery.



American Drill Grinder  
For Wet or Dry Drill Grinding  
 $\frac{1}{8}$ " to  $2\frac{3}{4}$ ". Also  
 $\frac{1}{8}$ " to  $3\frac{1}{2}$ " dia.

### LA SALLE TOOL CO.

La Salle, Illinois, U.S.A.

Represented in Canada by

**A. R. Williams Machinery Co., Ltd.**

64-66 Front Street W., Toronto

Halifax St. John, N.B. Montreal Winnipeg Vancouver



## BELTING

That ensures a  
big measure of  
efficient and  
economical

# SERVICE

We carry in stock Leviathan and Anaconda Belting, from 1" up, all plies, and are prepared to supply any length of belt at any time whether for conveying, elevating or transmission.

The belting comes in rolls of 500 ft., but we can supply any portion of this or one or more rolls at a moment's notice. Stocks carried at all points given in addresses below.

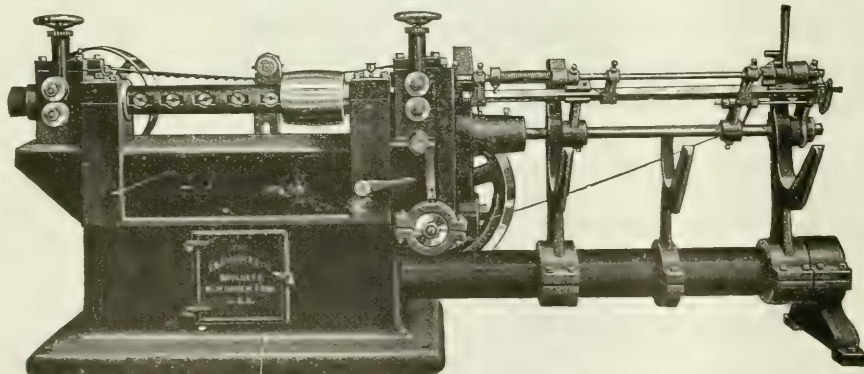
### MAIN BELTING COMPANY OF CANADA, LIMITED

MONTREAL  
10 Peter Street  
Tel. Main 7853

TORONTO  
32 Front Street West  
Tel. Main 1838

WINNIPEG  
W. W. Hicks, 567 Banning Street  
Sherbrooke 3C2

EDMONTON and CALGARY  
Gorman, Clancey & Grindley - Edmonton, Alberta



## Perfect Wire Straightening Quickly and Profitably Done on Our Automatic Wire Straightening and Cutting Machine

Just put your coil of wire on the reel, adjust the rolls and dies, and set the gauge for the length you want. The machine does the rest—thousands of feet per day, perfectly straight and cut to accurate lengths.

Catalogue tells more about them, and we will be glad to send you a copy.

## THE F. B. SHUSTER CO., New Haven, Conn.

FORMERLY JOHN ADT & SON

ESTABLISHED 1886

ALSO MAKERS OF STRAIGHTENERS FOR SQUARES, HEXAGONS, FLATS, ETC.

*If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.*



**HIGH SPEED STEEL  
INTRA STEEL GIBRALTAR STEEL  
Tool Steel for Every Purpose  
Swedish Lancashire Iron**

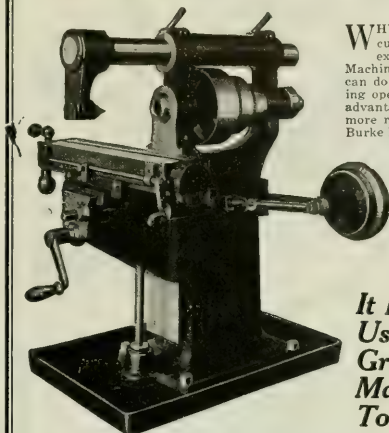
Twist Drills, Taps, Hack Saw Blades, Milling Cutters,  
Files, Etc.; Music Wire for Springs, Steel Balls,  
Cold Rolled Tool Steel in Strips and Sheets,  
Circular Saws, Machine Knives.

**PILOT STEEL & TOOL COMPANY  
LIMITED**

332 St. James Street, Montreal

Sole Agents for  
**JONAS & COLVER, LIMITED**      **H. BOKER & CO., Inc.**  
Novo and Continental Steel Works      New York, N.Y.  
Sheffield, Eng.

## This Power Feed Miller \$220



WHY buy a heavy, cumbersome and expensive Milling Machine, when you can do your small milling operations to better advantage and much more rapidly on a light Burke Milling Machine?

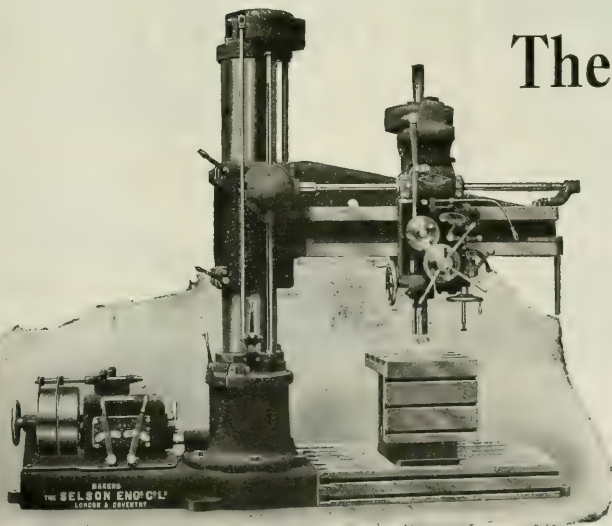
Catalog shows other sizes of Milling Machines with hand or power feed, with or without overhanging arm, either bench or column type.

**It Pays to  
Use High  
Grade  
Machine  
Tools**

**THE BURKE MACHINE TOOL CO.**

520 Sandusky St., Conneaut, Ohio, U.S.A.

Canadian Dealers:—H. W. Petrie Ltd., National Machinery & Supply Co., A. R. Williams Machinery and Supply Co., Canadian Fairbanks-Morse Co., Williams & Wilson, Garlock-Walker Machinery Co., Yeates Machinery Co., Cope & Sons, Geo. F. Foss Machinery & Supply Co.



## The "SELSON"

**Central Thrust  
Radial Drilling  
Machine**

The Selson form of Central Thrust is considered best for the Arm of Radial Drilling Machines.

# SELSON

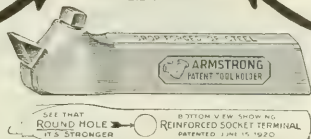
**Engineering Co., Ltd.**

**SELSON HOUSE, 83 and 85 QUEEN VICTORIA STREET  
LONDON, E.C. 4, ENGLAND**

Branches: Paris, Brussels, Turin, Milan, Melbourne, New York, 24 Stone Street.

*If interested tear out this page and place with letters to be answered.*





## TIME

### HIGH SPEED STEEL and GRINDING WHEELS

are a few of the expensive items which you can save by using **ARMSTRONG TOOL HOLDERS** ON YOUR LATHES and PLANERS.

Refuse Imitations and Substitutes.



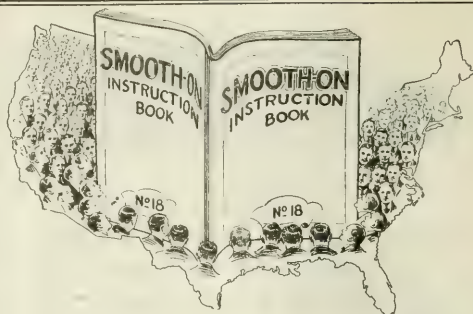
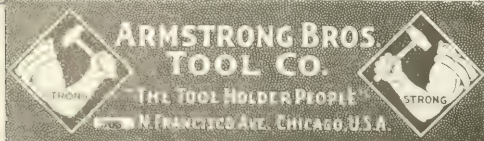
Effectively  
Equals  
a Dozen  
Forged  
Tools

Makes one Pound  
of High Speed  
Tool Steel  
Equals 10 Pounds  
in Forged Tools

Saves  
All  
Forging

Write for free catalog B-29.

A. R. Williams Machy. Co., Toronto. Williams & Wilson, Montreal.



## A Book of Knowledge---FREE

Compiled, endorsed, read and appreciated by engineers, this

### Smooth-On Instruction Book No. 18

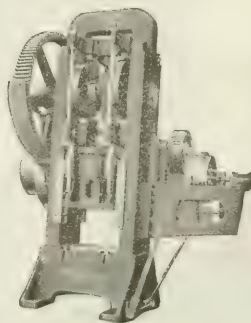
will help you solve your most serious Engine and Boiler room repair problems. Engineers the country over have contributed their experience to its pages.

Send for this book to-day—144 pages of valuable information. A Postal will bring it.

**SMOOTH-ON MFG. CO.**  
JERSEY CITY, N.J., U.S.A.

Canadian Distributors:  
**CAN. ASBESTOS CO., Montreal, Que.**

## THE "TOLEDO" PRESSES



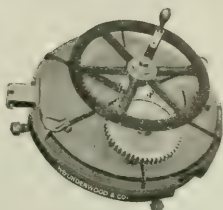
Carry with them assurance of the most exceptional performance—due to the excellence of design—the care and skill in construction and the high grade of materials used. The "Toledo" Double Action Cam Drawing Presses are particularly adapted for cutting and drawing, in one operation, cups and shells made from comparatively heavy metal.

**PRESSES FOR EVERY NEED**

**THE TOLEDO MACHINE & TOOL CO.**  
TOLEDO, OHIO

## Locomotive Cylinder or Dome Facing Machine

This is our latest Locomotive Cylinder or Dome Facing Machine. It embodies many improvements and has been pronounced very satisfactory.



Gearing is all cut from the solid. When working, the clutch is thrown in by moving the lever with clutch pin attached (shown in illustration, on top near the hand crank) and the machine feeds automatically. All working parts are covered and easily oiled. Taper socket can be furnished to take the place of hand wheel for air motor drive.

When ordering, give the inside diameter of the work. Details upon request.

**H. B. UNDERWOOD CORPORATION**

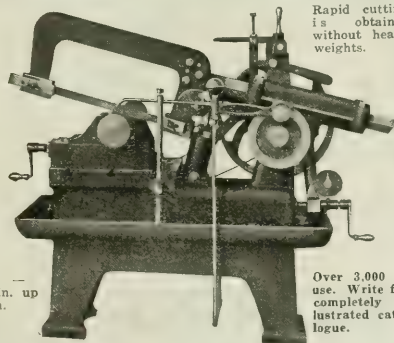
1025 Hamilton St.

Philadelphia, Pa., U.S.A.

## "Rapid"

**The Sawing Machine for Power and Fast Cutting Economy**

A POWERFUL, rigid construction, simple parts, low upkeep cost, and the ability to cut fast and with little waste make this "Rapid" Saw the right machine for a variety of cutting jobs.



Capacity —  
Bars 6 in. up  
to 26 in.

Rapid cutting  
is obtained  
without heavy  
weights.

Over 3,000 in  
use. Write for  
completely il-  
lustrated cata-  
logue.

**WILLIAMS & WILSON LTD.**  
84 INSPECTOR ST., MONTREAL

WHEN THINKING  
OF BELTING  
KEEP IN MIND THAT

*The back  
of the Ox*



is the part where the fibre of the hide is tightest and unaffected by the action of breathing, therefore the most suitable to produce a dead straight and practically stretchless belt.

**Tullis**  
LEATHER BELTING  
COLUMBIA BRAND

is made entirely from this portion of the hide.

SEND FOR OUR ILLUSTRATED CATALOGUE

**JOHN TULLIS & SON, LTD.**

BELTING SPECIALISTS

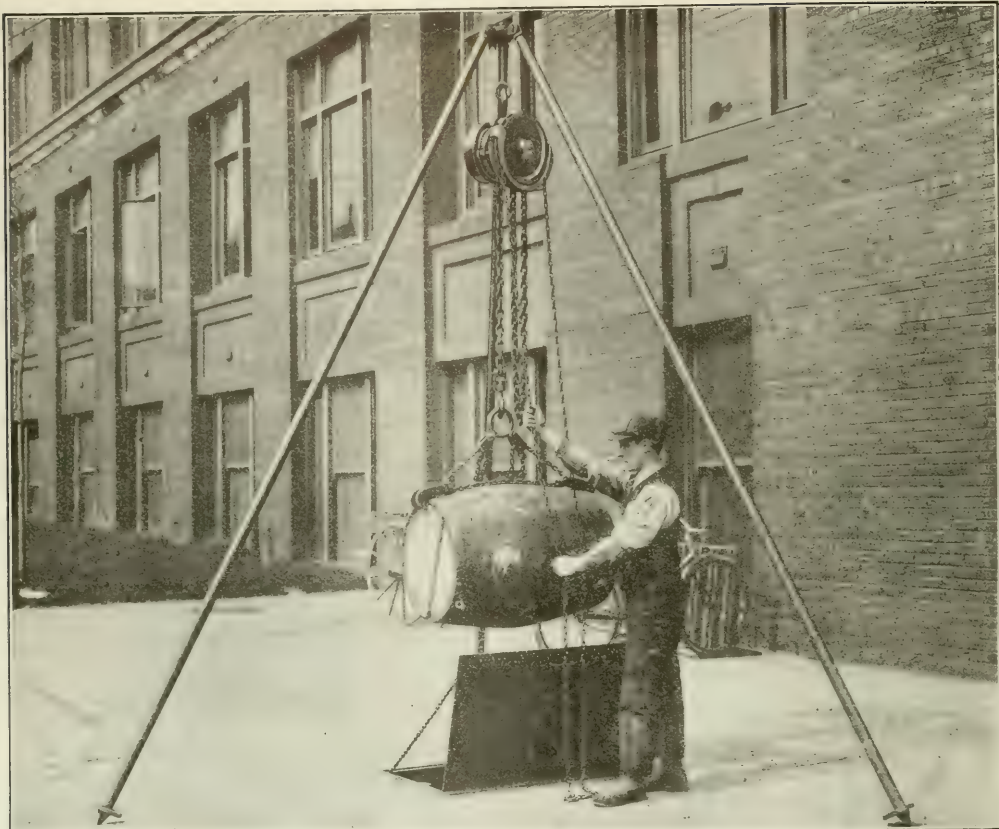
ST. ANN'S WORKS, GLASGOW, SCOTLAND

Established 1834

Canadian Agents:

**UNIVERSAL SUPPLIES Limited**  
Room 25, 204 St. James Street  
MONTREAL





## A FOLDING STEEL TRIPOD

Fitted with a Morris Triple Gear or Worm Gear Chain-block and used for setting machinery and making the occasional difficult lifts around your plant, will soon pay for itself and will occupy but little space when not in use.

**THE HERBERT MORRIS CRANE & HOIST CO., LIMITED**

HEAD OFFICE and WORKS  
**NIAGARA FALLS, CANADA**

Specialists in the design, manufacture and application of lifting machinery and material handling equipment.

**HERBERT MORRIS**  
**Cranes and Chain Blocks**

*If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.*



**"This Railroad  
Serves an  
Area That  
is**

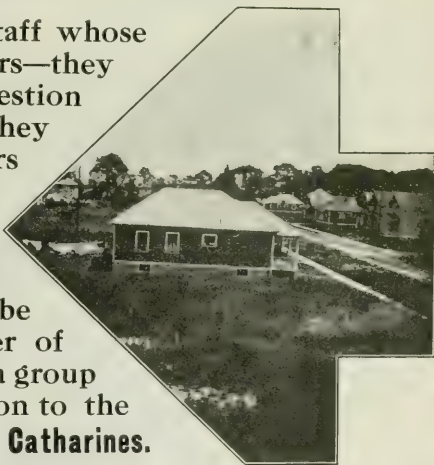
# Unequaled for Industrial Purposes!"

*So an American Manufacturer Describes  
Land Offered BY ST. CATHARINES, ONT.*

One of our oldest industries has a staff whose average of service is over ten years—they consider a big labor turnover a question that reflects on management—they state their workers are home-owners

## **A HOME-BUILDING CITY**

If you are looking for a city where intelligent civic co-operation can be obtained, where there is a Chamber of Commerce ready to co-operate and a group of business men giving daily attention to the "needs of business"—**Locate in St. Catharines.**



**Home-Owning Labor—Parks—Lake—Industrial Content Based on  
a Good Place to Live In—Just What You Seek!**

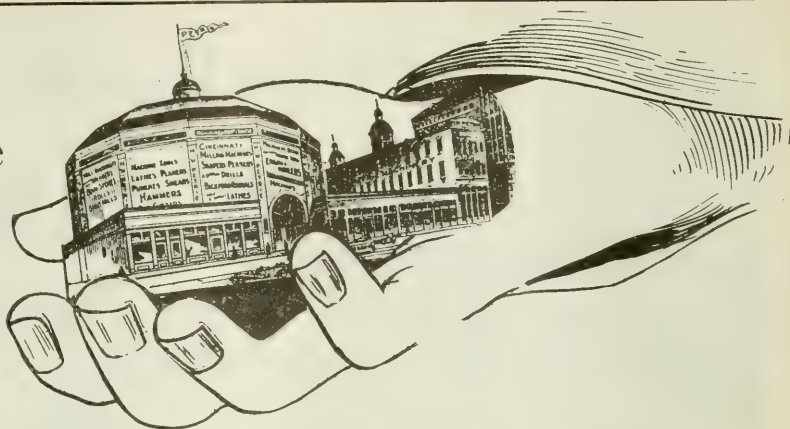
*Wire or Write Manager Chamber of Commerce*

# ST. CATHARINES, ONTARIO

**"THE GARDEN CITY OF CANADA"**



Canada's  
Dependable  
Machinery  
and  
Supply  
House



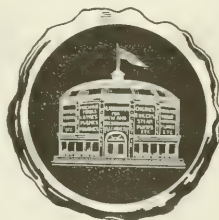
130,000 Square Feet of Floor Space Filled with Quality

# MACHINERY<sup>AND</sup>SUPPLIES

*ORDER NOW --- it's important*

**W**HAT Canadians need most to-day is confidence backed up by action. Too many orders for goods that are needed are being held up awaiting developments. If everybody waits for the other fellow to start something business cannot revive. Don't hesitate. Put your shoulder to the wheel by putting your orders through without further delay. There's nothing to be gained and everything to lose by holding back your order for Machine Tools and Supplies. LET US HAVE IT NOW.

Lathes, Planers,  
Millers, Grinders,  
Shapers, Drills,  
Boring Mills,  
Punches, Shears,  
Wood Planers,  
Wood Shapers,



Saw Tables, Matchers,  
Engines, Boilers,  
Pumps, Electric Motors,  
Belting, Hangers,  
Shafting,  
Supplies, etc.

**H. W. PETRIE LIMITED**  
TORONTO and HAMILTON

# PETRIE

*If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.*

# MILWAUKEE MILLING MACHINES

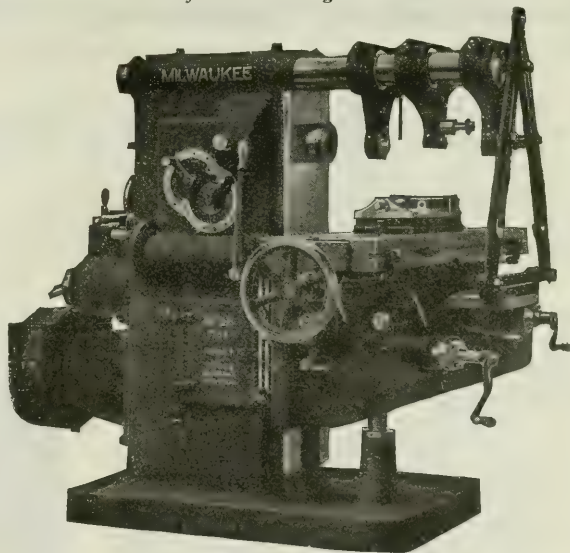
## EFFICIENT MILLING

**T**HE rigidity and reserve power of Milwaukee Milling Machines permit high speeds and deep cuts without impairing the accuracy of the work.

These sturdy machines are quickly set up and easily operated. They are economical on light or heavy milling.

Constant speed drive, hardened steel gears and shafts, automatic flooded lubrication, double over-arm, solid top, box-section knee with extended slide, flanged spindle, reverse self-contained, cutter lubricating pump that operates only when spindle revolves—these are the features that make Milwaukee Milling Machines profitable producers.

*Write for our catalogue—NOW*



**KEARNEY & TRECKER**  
CORPORATION  
**MILWAUKEE, WIS., U.S.A.**

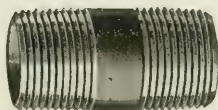
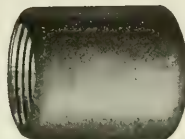
Canadian Representatives:

Williams & Wilson, Ltd., Montreal. F. F. Barber Machy. Co.,  
Toronto. A. R. Williams Mach. Co., Vancouver and Winnipeg.



# WROUGHT PIPE

## COUPLINGS and NIPPLES



Each length of M.R.M. Pipe is tested to withstand a pressure of 600 pounds per square inch.

Supplied in black, or galvanized.



HAMILTON

MONTREAL

## 24-inch Universal Shapers

Into the design and construction of Universal Shapers have gone the united knowledge and best efforts of a staff of specialists in the tool, jig and machine tool field.

### *Consider these features—*

It planes parallel in the heaviest cuts.

It planes accurately—horizontally as well as vertically.

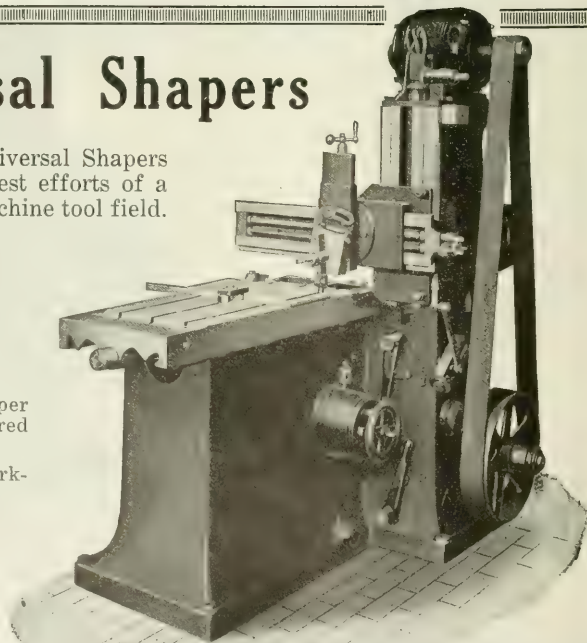
It handles efficiently a wide range of shaper and planer jobs—particularly those considered awkward by **both** these machines.

Operator can reach all adjustments from working position.

**Have you full particulars?**

**Universal Machine & Tool  
Company**

Canton, Ohio, U.S.A.



**ACCURACY**

*If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.*

TRADE



MARK

# "AW" DRILLS

Milled or Twisted

From the raw materials entering the steel to the finished drill a rigid inspection is given after each operation, which assures a superior product.

*Prompt Deliveries  
on Special Sizes*

## High Speed Twist Drills

The Drills for  
**MAXIMUM  
PRODUCTION**

*All Standard  
Sizes Carried  
In Stock.*



## ARMSTRONG WHITWORTH OF CANADA, LIMITED

Head Office:

298 St. James St., Montreal

Works:

Longueuil, Que.

BRANCHES:

126 WELLINGTON ST. W., TORONTO

McARTHUR BUILDING, WINNIPEG

Saves Time, Labor,

Expedites

Production

## ROCKFORD Milling Machine

*Its speed, simplicity of operation and great utility  
Assures Big Profits in whatever work it is used.*

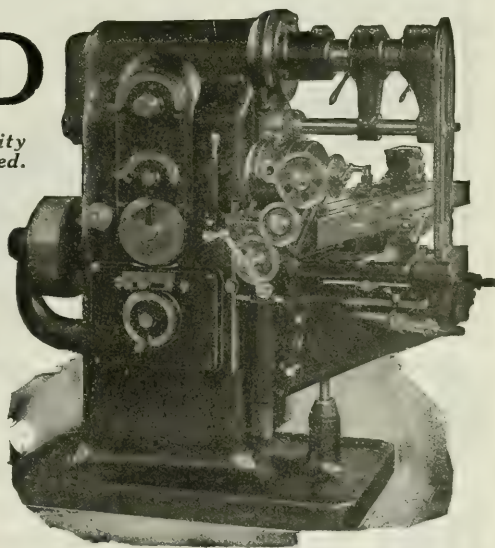
And another profit-making feature of the "Rockford" Miller lies in its unusual capacity to do all classes of work.

In the tool room, in the shop, in the manufacturing or jobbing establishment this "Miller" is beyond comparison.

## Has Power to Spare

Put the power of the "Rockford" to the severest tests. It's built to more than meet the demands likely to be made upon it. It is the pace-maker of the machine shop.

Look into the merits of this machine. Write to us without delay.



**ROCKFORD MILLING MACHINE COMPANY, ROCKFORD, ILL.**

Canada: Rudel-Belnap Machinery Co., Toronto, Ontario.

FOREIGN REPRESENTATIVES: Great Britain, A. A. Jones & Shipman, Ltd., Leicester, England. France and Belgium, Louis Besse, Paris, France. Italy and Colonies, Società Anonima Adler & Co., Milano. Scandinavia, Rylander & Asplund, Stockholm, Sweden. Spain and Portugal, Casamitjana Hermanos, Barcelona, Spain. Australia, Selson Engineering Co., Melbourne, Australia. Russia, M. Mett Engineering Co., Petrograd, Russia.



# HANNA

**IRON ORE - PIG IRON**

Cleveland

Cincinnati

Sales Agents:  
Pittsburgh

Toronto

Buffalo

Detroit

## Plan Your Oil Storage

Haphazard methods of storing and handling oils are costly, dangerous and unnecessary.

**BOWSER**  
ESTABLISHED 1865

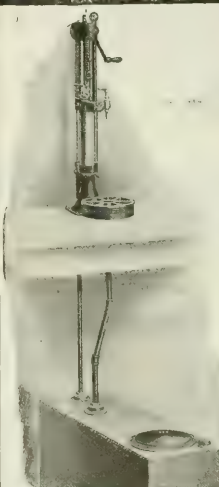
### Oil Storage and Distributing Systems

store and handle all oils in a systematic, safe and saving manner—they prevent all loss of oils—make every drop of oil count.

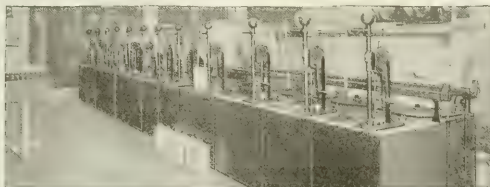
In factory, machine shop, power plant or wherever oils are used, **BOWSER** Storage Systems pay for themselves many times, through the saving in oils, besides the saving in labor and floor space.

**S. F. Bowser Co., Ltd.**

66-68 Fraser Ave., Toronto, Can.



**BOWSER**  
Oil Storage  
GIVES  
Convenience  
AND  
Safety



**BOWSER**  
Oil Storage  
IS  
Systematic  
AND  
Saving

# CUT GEARS

*Theoretically Correct*

PROMPT SERVICE

**ROBERT GARDNER & SON**  
LIMITED

52 NAZARETH ST., MONTREAL, P. Q.

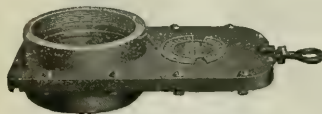
# RAWHIDE OR METAL

If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading

## 3 FOR 1

The 6" blast gate furnished by you has proven entirely satisfactory. It is answering the purpose of an 8" gate valve, which would cost several times as much as a blast gate.

Indianapolis, Ind.  
THE BAUR CARBONIC COMPANY  
(Signed) Oscar Baur, Pres.



**NEW AIR-TIGHT BLAST GATE**  
Light. Strong. Compact. Inexpensive. Quick-Acting.

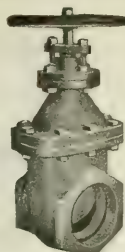
You have the same opportunity to save practically two-thirds of what you now pay for gate valves.

Low in first cost and upkeep, easily and quickly operated, affording the full area of the pipe these and other advantages make our New Air-Tight Blast Gate an ideal substitute for heavy, cumbersome, expensive and slow-acting gate valves.

This new Air-Tight Blast Gate is made in sizes from 2" to 16", threaded and flanged. Descriptive circular 210-T gives detail dimensions of all sizes. Write for copy to Canadian branch.

### W. S. ROCKWELL COMPANY

Furnace Engineers and Contractors  
50 CHURCH ST. (Hudson Terminal Building), NEW YORK  
Canadian Distributors: Drummond, McCall & Co. Limited, Montreal



**GATE VALVE**  
Heavy. Cumber-  
some. Expensive.  
Slow-Acting.



### CLEVELAND "FOUNDRY" CHIPPERS

Are Dust-Proof      Easy To Hold      Easy To Control

#### A Remarkable Tool for Fast Chipping

Made in "Seventeen" sizes with "Open" or "Enclosed" handles—  
Outside or Inside Latch.

### CLEVELAND FOUNDRY RAMMERS

For Floor - Flask - Bench or Core Work

Run Fast  
Hit Hard



Have No  
Vibration

Cleveland Rammers Are "Dust-Proof"



They cost less for "Up-Keep" than any Rammer made.

### BOWES AIR HOSE COUPLINGS

AND

### CLECO PRESSURE-SEATED AIR VALVES

"Are Standard Equipment Everywhere"



Style P.O.



Cut shows Never-Slip Clamp Attached.  
Write for Bulletins Nos. 44-48



Style A.

IN STOCK: Riveting Hammers, Piston Air Drills, Corner Drills,  
Compound Drills, Portable Grinders, Etc.

## CLEVELAND PNEUMATIC TOOL CO., OF CANADA, LIMITED

84 Chestnut St., Toronto, Ont.

337 Craig St., Montreal, Que.

## The "PINK" Line Logging Tools and Handles



### MADE-IN-CANADA Products---Headquarters for British Empire for all Lumbering Tools

In every lumber camp in Canada you'll find "PINK'S" famous lumbering tools. They are the favorites there and have won the esteem of all woodsmen through their superior merit. They are world-renowned and are extensively used in Australia, New Zealand and other countries where the lumbering industry thrives.

### EXPORTERS TO EUROPE

We export the same good quality of lumbering tools that have made "PINK'S TOOLS" a by-word in the matter of good tools in all Canadian lumber camps. Enquiries cordially solicited.

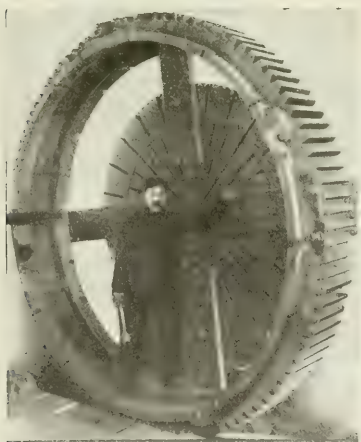
### Thomas Pink Co., Limited

PEMBROKE, ONT., CANADA

If interested tear out this page and place with letters to be answered.



# STEEL CASTINGS



## “HISCO”

**Steel, Chrome, Manganese, Nickel**  
**Annealed and Unannealed**

Dependable Steel Castings for Cement Mills and Mining Machinery, Stamp Mills, Crushing Plants, Excavating Outfits, Steel Car Wheels, Locomotive Driving Wheels and Frames, etc.

### MACHINE MOLDED GEARS

There's no pattern expense connected with “Hisco” Machine Moulded Gears. Made up to 18 feet in diameter. Right in quality, accurate, and low in price.

**Hull Iron & Steel Foundries, Limited**  
**Hull, Quebec**



## The Automatic Double-Roll Feed

on this "BLISS" No. 69-N Cam Drawing Press makes possible an output of 3500 rod-ends per hour for Simmons Brass Beds, while the operator sits back and takes it easy. The stock used is 18 gauge, 3 inch strip brass.



1857

## E. W. Bliss Company

*Main Offices:* BROOKLYN, N. Y., U. S. A.

*American Factories:* BROOKLYN, N. Y.; HASTINGS, MICH.; CLEVELAND, O.; SALEM, O.

### SALES OFFICES

CHICAGO, People's Gas Bldg. DETROIT, Dime Bank Bldg. CLEVELAND, Union Bank Bldg.  
CINCINNATI, Union Trust Bldg. BUFFALO, Marine Bank Bldg. ST. LOUIS, Boatmen's Bank Bldg. PITTSBURGH, Keenan Bldg.

### FOREIGN SALES OFFICES and FACTORIES

LONDON, ENGLAND, Pocock Street, Blackfriars Road, S. E.

PARIS, FRANCE, 100 Boulevard Victor-Hugo, St. Ouen



1921



---

An Organization Can Best Be Judged by the Service of Its Merchandise

---

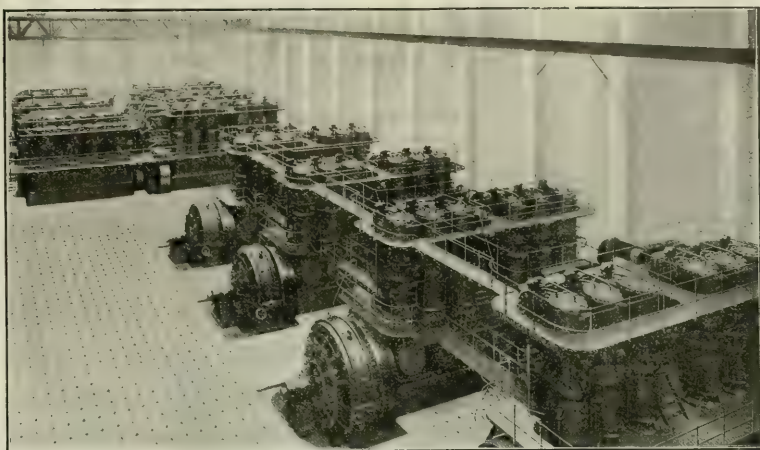


# MALLEABLE CASTINGS

THE re-incorporation of the Smiths Falls Malleable Castings Limited, the second oldest malleable castings concern in Canada, has taken place. The knowledge gained by forty-three years' experience is represented in every casting we make. Starting in 1878 in a small way with a cupola and a one-ton annealing oven, a high standard of quality constantly maintained has built two plants covering the better part of two acres and having an annual capacity of 8,000 tons.

**Established 1878**

**Smiths Falls Malleable Castings**  
**LIMITED**  
**Smiths Falls, Ontario**



An installation at an Iron and Steel Works of Seven "National" Vertical Tandem Gas Engines. (Four 1500 B.H.P. Engines driving D.C.-Generators, and three 1500 B.H.P. Engines driving Reciprocating Blowers) Operating on Blast Furnace Gas.

## BY TEST THE BEST

**D**UE to the excellent turning effort and good governing obtainable, the "National" Vertical Tandem Gas Engine is particularly suitable for driving electrical generators, both A.C. and D.C.

Briefly, the advantages of this engine are:

- Low fuel and oil consumption.**
- Regularity of speed.**
- Reliability.**
- Ease in starting.**
- Small floor space occupied.**

Made in Sizes from 300 to 2,000 B.H.P.  
Adapted for All Kinds of Work and  
All Kinds of Gases.

*We solicit your enquiries.*

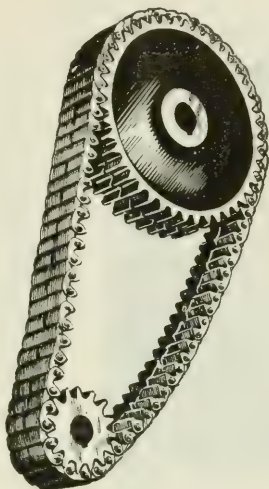


GAS, OIL AND  
PETROL ENGINES

SUCTION  
PRODUCER GAS PLANTS

**The National Gas Engine Co., Ltd.**  
Ashton-Under-Lyne - England





Typical Renold Silent Chain Drive.

FROM 1879

# "RENOLD"

(Hans Renold Limited, Manchester, Eng.)

THE UNIVERSAL NAME FOR POWER TRANSMISSION

## CHAINS

Let Renold Chains solve your problems and ensure you maximum efficiency, durability and service. Our engineering service is at your disposal. Write us.

*Prompt deliveries from Montreal stocks.*

### Hans Renold of Canada LIMITED

11 St. Sacrament Street  
MONTREAL

32 Front Street West  
TORONTO

# Solid Woven Belting



**Solid Woven  
Cotton  
Hair  
Twintex**

*These beltings will solve your driving problems and save you money.*

**SUMNER & CO.**  
108 WORTH ST.  
NEW YORK

**Solid Woven Hair Belting  
Driving Heavy Machine Tools**

Representative for Eastern Canada  
**GEORGE F. SHEPPARD**  
702 Southam Bldg., Montreal

# STEEL *for* Every Commercial Purpose

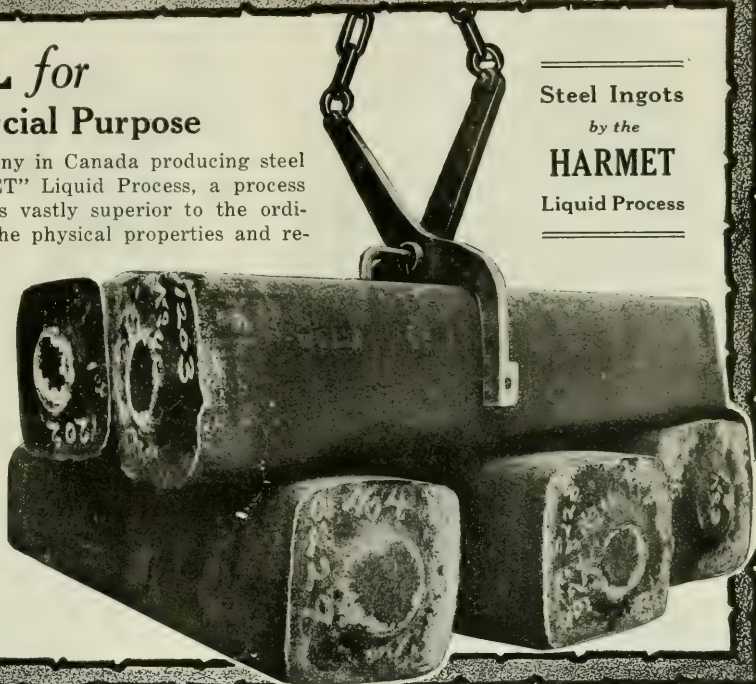
We are the only company in Canada producing steel ingots by the "HARMET" Liquid Process, a process that makes these ingots vastly superior to the ordinary kind, improving the physical properties and reducing the waste of ingot.

We can supply forgings of all shapes and sizes made of ordinary or "HARMET" Fluid Compressed Open - Hearth Steel on the Shortest Notice.

**Nova Scotia  
Steel and Coal  
Co., Limited**

Head Offices:  
New Glasgow, N.S.

Sales Offices:  
Western Room 14 Windsor Hotel  
MONTREAL



Steel Ingots  
by the  
**HARMET**  
Liquid Process

## ALLIGATOR TRADE MARK REG. U.S. PAT. OFFICE STEEL BELT LACING

Best for Every  
Type of Belting

Nothing  
Needed But a  
Hammer

The  
Strongest  
Belt Lacing  
On Earth

Double Staggered  
Teeth Insures  
Strong  
and Firm Grip  
"Never  
Lets Go"

Reg. U.S. Pat. Office

### Push Your ALLIGATOR Sales

Quick application, belt saving features, economy and general satisfaction make ALLIGATOR Steel Belt Lacing the logical belt lacing to sell your trade.

ALLIGATOR Steel Belt Lacing works equally well on any kind or thickness of power or conveyor belting. Anyone can put it on. Requires no tool but a hammer. Three minutes' average time makes a permanent, flexible joint, with two working surfaces, that is stronger than any other known.

ALLIGATOR Steel Belt Lacing is being advertised nationally to master mechanics, shop superintendents, purchasing agents, executives, etc., in all classes of publications. Demand is growing stronger. A size and type for every need. Write on letterhead for samples and trade prices.

FLEXIBLE STEEL LACING CO.

4510 Lexington Street, Chicago, Ill., U.S.A.

135 Finsbury Pavement, London, E.C. England

Stocked by the Best Supply Houses Throughout Canada

### DROP FORGINGS

Are sometimes cheaper than castings—Always far superior.



### DROP FORGINGS

One of the Largest  
and Best Equipped  
Plants anywhere.

Consult us  
as to your  
requirements.

**Dominion Forge & Stamping Co., Limited**  
Walkerville, Ontario

Toronto Office - Excelsior Life Building



THERE is as much difference in the various makes of High Speed Steel as there is in men—

The practice and methods of manufacturers differ widely in every mill and anyone who is at all familiar with the manufacture of High Speed Steel thoroughly understands this

## "Red Cut Superior"

The Nationally Known—First Quality  
**HIGH SPEED STEEL**

is the best for all Machine Work

ARE YOUR TOOLS MADE OF "Red Cut"?

**VANADIUM-ALLOYS STEEL  
COMPANY**

Main Office and Works :  
Latrobe Pa.

BRANCH OFFICES:

TORONTO  
MONTREAL  
NEW YORK

BUFFALO CLEVELAND  
BOSTON CHICAGO  
PHILADELPHIA

CINCINNATI  
DETROIT  
PITTSBURGH



## VENUS PENCILS

*The largest selling Quality pencil in the world*

"Pencils of Precision," engineers call them; perfect tools for producing the graphic language of sketch, plan and blueprint—always smoother than you dreamed.

17 black degrees, 3 copying

For bold heavy lines

6B-5B-4B-3B

For general writing

and sketching

2B-B-HB-F-H

For clean fine lines

2H-3H-4H-5H-6H

For delicate thin lines

7H-8H-9H

Plain Ends, per doz., \$1.50

Rubber Ends, per doz., 1.75

At stationers and stores  
throughout the world.

**American Lead Pencil Co.**

238 Fifth Avenue, New York  
and London, England

CANADA  
**FOUNDRIES & FORGINGS**  
LIMITED

## Drop Forged Steel



**SOLID—NOT WELDED**

16 Sizes with  
without } Stubs

**Canada Foundries & Forgings**  
Welland, Ont.

If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.

# STEEL CASTINGS

**QUICK  
DELIVERIES**

**High Carbon Steel  
Manganese Steel  
Chrome Steel  
Mild Steel**

**QUALITY  
GUARANTEED**

Sizes— $\frac{1}{2}$  lb. to 5,000 lbs. each

**THE WILLIAM KENNEDY & SONS,  
LIMITED**  
OWEN SOUND, ONTARIO  
ESTABLISHED 1860

## CANADIAN ATLAS CRUCIBLE STEEL Co. LIMITED

**Made in Canada**

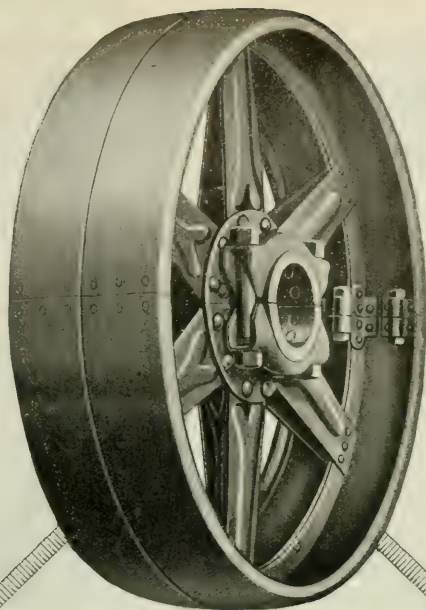
**L-XX HIGH-SPEED  
ATLAS TOOL STEELS  
ATLAS ALLOY STEELS**

for Machine Tools, Automotive Parts, etc.  
Noted for their uniformity

**Hot Rolled, Forged Blocks and Discs  
Cold Drawn Steel and Drill Rod**

GENERAL SALES OFFICE:  
133 Eastern Avenue, TORONTO, ONT.  
Works: WELLAND, ONT.

Sales Offices and Warehouses:  
TORONTO, ONT. MONTREAL, QUE. WINNIPEG, MAN.



## AMERICAN STEEL SPLIT PULLEYS



*Judge Your Pulleys  
by What They Save*

**L**IKE the racing shell, the "American" Pulley is built with minute attention to weight, balance and surface friction. All chance for wasted power through excessive weight, air resistance, poor balance and belt slip has been reduced to the minimum.

No detail has been too fine to be overlooked in the construction of the "American" Pulley. The value of these points are shown in detail in a booklet, "Getting Maximum Pulley Efficiency." It is well worth sending for.

**The AMERICAN PULLEY CO.**

Philadelphia, Pa.

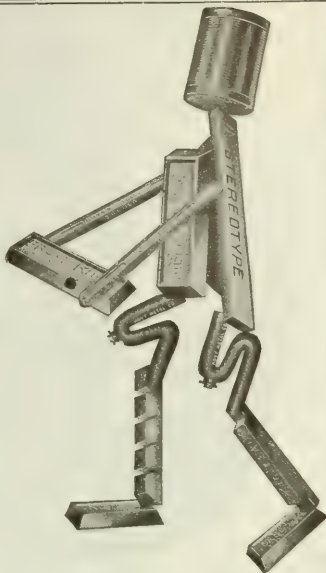


## FROST KING BABBITT

will withstand heavy pressure without increasing its temperature.

For general machinery bearings it is without a peer.

If you are from Missouri try a sample lot and be convinced.



**HOYT METAL COMPANY**  
MONTREAL TORONTO WINNIPEG

## Increased Output and Lower Operating Costs

follow the use of  
**P.H. and IMPERIAL  
FILES.**

*"They Cut Faster and  
Wear Longer."*

**Be File-Wise.**

**INGERSOLL FILE COMPANY,  
LIMITED.**

John Morrow Screw and Nut Company  
Limited,  
Sole Distributors,  
Ingersoll, Ontario

**INGERSOLL**

IMPERIAL

*McDougall*

# SHAPERS

## Rigidity Plus

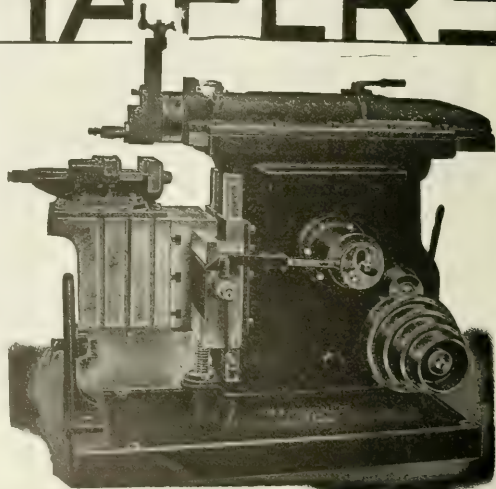
### Simple Design and Convenience of Adjustments

*give operator every facility for ease of  
operation and Accuracy in Production*

Our circulars, containing complete  
specifications and descriptions, are  
ready. Write us for one.

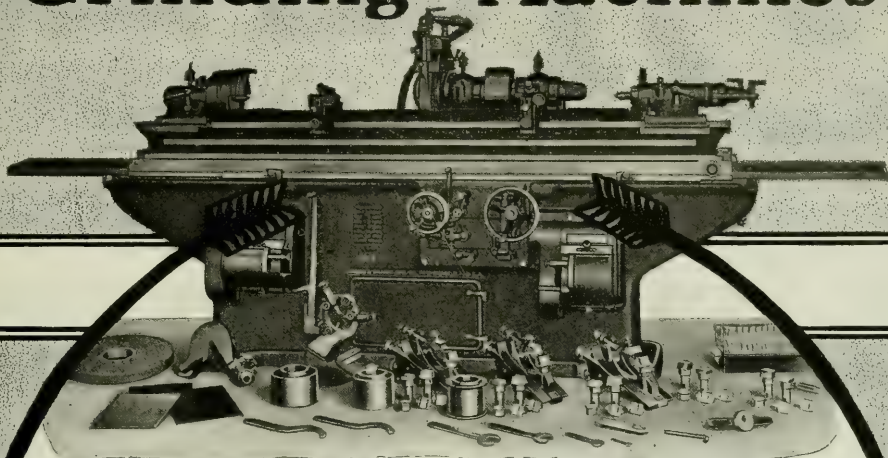
**The R. McDougall Co., Limited**  
Galt, Ontario

THE CANADIAN FAIRBANKS-MORSE CO., LIMITED  
Sales Agents



*If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.*

# BROWN & SHARPE Heavy Service Grinding Machines



**The Correct Speed and Feed for Any Diameter Easily and Quickly Obtained**

**Why You Should**

*Specify  
B & S Machines.*

Brown & Sharpe Plain Grinding Machines on short jobs of making repair parts or on long manufacturing runs assure low production costs and high standards of accuracy. Staunchly constructed, these powerful machines allow rapid operation, while the handy arrangement of operating levers, hand wheels, etc., make quick set up possible.

Other features that instantly appeal to the shop man and equally as noteworthy as the one pictured here are—

An accurately and quickly adjustable automatic cross feed—Independent automatic cross feed for feeding wheel to work without traversing table—Universal back rests.

The wide range and complete separation of speeds and feeds on this machine provides a combination that will assure any desired result as to finish or rate of production, while the ease and quickness with which any speed and feed can be obtained, by simple and quick adjustments of work speed and table feed change levers as shown in small illustration below, saves valuable time and eliminates guesswork. Especially advantageous on short run jobs.

*Send for catalog*

**BROWN & SHARPE MFG. CO.**  
PROVIDENCE, R. I., U. S. A.

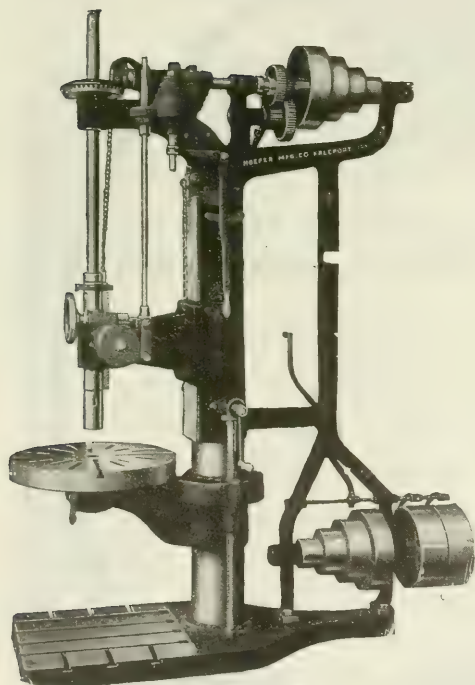
*Canadian Representative:*  
Canadian Fairbanks-Morse Co., Ltd.





# HOEFER

## The complete drilling service



When we say Hoefer Drilling Service is **complete**, we **mean** it. Suppose, for example, you are now drilling a number of holes in a single piece and wish to reduce the drilling cost on the job. All you need do is to send Hoefer a postcard telling about it.

Hoefer studies your proposition from every angle, tells you definitely whether your present method can be improved upon and if so gives exact figures of the cost of new equipment and the saving it will effect for you. The decision is left entirely to you without argument. Then, if you consider the investment worth-while, Hoefer designs and builds **every** portion of the drilling equipment, with all necessary jigs and fixtures ready to run, and finally, guarantees results both as to quality and quantity.

That's why we say Hoefer Drilling Service is **complete**. There are no gaps for you to fill in. Are you interested? Just drop us the postcard and take advantage of the first phase of Hoefer Service. It places you under no obligation.

*Send for the Hoefer Catalog.*

## HOEFER MFG. CO., FREEPORT, ILL.

Canadian Representatives: CANADIAN FAIRBANKS-MORSE CO., MONTREAL. Branch Offices Throughout Canada.

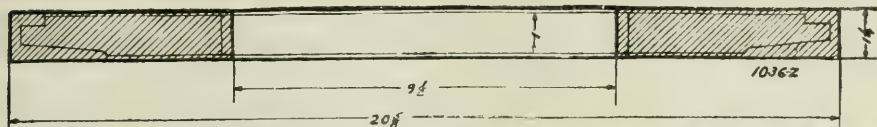
Sales Engineers for Hoefer Heads: Chicago, 42 Washington Bldg. New York, 26 Church St. Philadelphia, 105 R. B. Bldg. Buffalo, 11100 State Bldg. Cleveland, 10000 B. B. Bldg. Pittsburgh, Empire Bldg. Detroit, 602 Kerr Bldg. Milwaukee, 10000 B. B. Bldg. Indianapolis, 10000 B. B. Bldg. Minneapolis, 10000 B. B. Bldg. St. Louis, 10000 B. B. Bldg. St. Paul, 10000 B. B. Bldg. Minneapolis, 10000 B. B. Bldg. Montreal, 10000 B. B. Bldg.

Sales Offices for Hoefer Drilling: Boston, 10000 B. B. Bldg. Providence, 10000 B. B. Bldg. New York, 10000 B. B. Bldg. Philadelphia, 10000 B. B. Bldg.

Fairbanks-Morse Co., 917 Arch Street. Baltimore, 10000 B. B. Bldg. Albany, 10000 B. B. Bldg. Buffalo, 10000 B. B. Bldg. Rochester, 10000 B. B. Bldg. Syracuse, 10000 B. B. Bldg. Cleveland, 10000 B. B. Bldg. Chicago, 10000 B. B. Bldg. Indianapolis, 10000 B. B. Bldg. Milwaukee, 10000 B. B. Bldg. St. Louis, 10000 B. B. Bldg. St. Paul, 10000 B. B. Bldg. Minneapolis, 10000 B. B. Bldg. Montreal, 10000 B. B. Bldg. Mobile, 10000 B. B. Bldg. Birmingham, 10000 B. B. Bldg. Young & Rubicam Co., 10000 B. B. Bldg. San Francisco, 10000 B. B. Bldg. Los Angeles, 10000 B. B. Bldg.

*If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.*

# GISHOLT



## 40 Minutes Typical Boring Mill Production

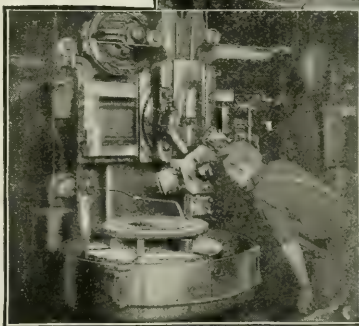
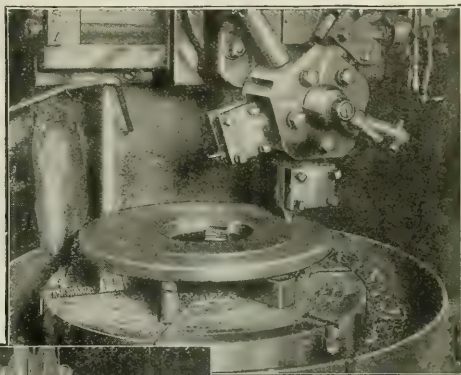
The workman shown at the right is interested in the job.

You are interested in the time it takes to do it.

The workman appreciates the ease with which the job is handled and the confidence he has in the machine.

You appreciate what these qualities mean to the cost of handling this, and similar work.

The part shown is a Scroll Plate for Chuck. Material, steel forging. Finished all over in two operations on the Gisholt Vertical Boring Mill.



**Why not let a Gisholt Salesman study your Boring Mill operations? Our men are trained to render you valuable service along this line.**

### GISHOLT MACHINE CO.

1207 East Washington Ave.  
MADISON, WIS., U. S. A.

*Builders of Standard and Automatic Turret Lathes, Vertical and Horizontal Boring Mills, Tool Grinders, Small Tools, Special Machinery, Etc.*

*Eastern Sales Office: 30 Church St., New York. Works: Madison, Wis.; Warren, Pa.*

**Canadian Agents: The Canadian Fairbanks-Morse Co., Ltd., St. John, Quebec, Montreal, Ottawa, Toronto, Hamilton, Windsor, Winnipeg, Saskatoon, Calgary, Vancouver, Victoria**

*If interested tear out this page and place with letters to be answered*

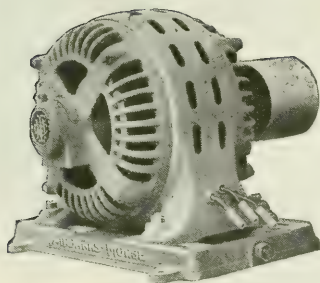


## FAIRBANKS - MORSE BALL-BEARING MOTORS Give Uninterrupted Service

The absolute dependability of Fairbanks-Morse Motors accounts for their extensive use in Machine Shops throughout the world.

These ball-bearing motors have set a new high efficiency standard in saving power. The bearings, packed in grease, reduce friction and assure continuous operation.

The one-piece solid rotor winding with cast-on end rings, insures greatest electrical efficiency by preventing arcing due to loose rivets or screws, and eliminates costly repair bills.



You should not buy or specify electric motors until you have thoroughly investigated Fairbanks-Morse Ball-Bearing Motors. Write our nearest sales office for any information you need.

### If it isn't here —write us

Fairbanks-Morse Dynamos  
Allen Steam Engines  
Fairbanks-Morse Oil Engines  
Electrical Supplies  
Transmission  
Boiler Room Equipment  
Pump House Equipment  
Valves  
Pipe Fittings  
Durabla Packing  
Palmetto Packing  
Fairbanks Seals

## The Canadian Fairbanks-Morse Co., Limited

*"Canada's Departmental House for Mechanical Goods"*

Halifax  
St. John  
Quebec  
Montreal

Ottawa  
Toronto  
Hamilton

St. Catharines  
Windsor  
Fort William

Winnipeg  
Regina  
Saskatoon

Calgary  
Edmonton  
Vancouver  
Victoria

# Fairbanks- Morse



*If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.*

# CANADIAN MACHINERY

AND  
MANUFACTURING NEWS

VOL. XXV, No. 21

May 26, 1921

## *You Have Come Through the Worst of It*

**W**E are passing through that period of re-adjustment that hurts. For a long time we turned that word over as something that was to come. It would affect every business house except our own and touch every income except our own.

For over two years after the war we went through a period of poisonous and alluring fallacy. We came almost to the point of believing that for the benefit of this particular day and generation history was not going to repeat itself.

Every man who had anything to say started with the solemn declaration that pre-war conditions would never be repeated—that we had arrived at a new stage where we had a few more dollars and each dollar was worth a little less.

It is all very well when you have a sick man to give him a jab of some stimulant to brace him up.

**It is the course of sanity to have the disease removed rather than the patient doped beyond the point where it is possible for him to permanently rally.**

Some months ago we had a much-advertised campaign showing that prices went up a step at a time and would not come down on the bannister. A gradual ease-off on prices may be quite desirable but it makes a long declining market, and a declining market is the best thing in the world to kill business.

Where is our Canadian courage that went through the crisis of 1914—that rallied to a buying movement in the face of a world war—that tackled, solved, and mastered the making of war munitions?

**It is time it showed itself again in placing business that has been hanging fire month after month.**

When any one section of the business community decides it is going to get out of the

markets and stay out of the market, and that it will sell and not buy, it sets in motion a dangerous and undesirable movement that will come back upon that section just as surely as day will follow night.

There are too many men and there are too many firms in the country with the one object of seeing how much they can take out of the business world to-day.

They have not yet grasped the fact that if they keep on taking out more than they are putting in the world is going to be poorer by reason of their existence.

**If you can place business at the present time, it is your duty, as a citizen of this country, to do it.**

If you are not prepared to do your share in combating the sleeping sickness that seems to have seized the business community, you may be called upon to contribute more handsomely in an effort to rescue it from a more serious condition later on.

If you are still nursing memories of the time when you were making \$12 a day in a shell shop, and when there were a dozen jobs to you all the time—forget it.

Remember there were hundreds of thousands standing in a trench in France at \$1.10 per day at the same time.

**This country is better off than any country under the sun at this time. There are many firms doing 60 per cent. of their 1920 business.**

It is not fair to count the last part of 1919 and 1920 as normal years. They were abnormal. A more just comparison is with 1913 and 1914.

Weed out your wasteful habits. Spend a little less than you earn.

If you have weathered the storm this far you have gone through the worst.



# Business Conditions in the Canadian Centres

Trade Has Been Rather Dull in All Centres—West Shows Substantial Industrial Expansion—U. S. Branches Continue to Look to Canadian Cities as Locations For Branch Factories

## AMERICAN FIRMS LOOKING FOR LOCATIONS IN CANADA

Hamilton Reports That Conditions Are Better Than In Early Part of the Year—Many Inquiries Are Being Made by U.S. Firms Regarding Locations

By C. W. KIRKPATRICK,  
Industrial Commissioner, Hamilton.

**HAMILTON**—Although industrial and employment conditions are still far from being normal, there has unquestionably been a very noticeable improvement during the month of April and the early part of May, with better prospects that by the fall of the current year things will have reached a more normal level and conditions have become more satisfactory for both employer and employee.

During the past month there have also been unmistakable signs of considerable industrial development in the near, if not immediate future. Many American manufacturers are again turning their eyes towards Canada and are apparently not only gathering information by correspondence, but also making personal investigation to acquaint themselves with the Canadian market and its possibilities. Owing to the abnormal conditions that have existed since last fall, there has been less industrial expansion than usual this spring, but the local Industrial Department has been kept fairly busy supplying information to, and otherwise assisting prospective locators, and indications are that once they are satisfied that the period of depression or inactivity, through which nearly all countries have passed, is drawing to a close, there will be a rush of American capital and American industries to Canada and more especially to the province of Ontario.

While times have not been as good as during the two years following the close of the great war, locally, at least, there is little cause to worry about the future. Manufacturers, wholesalers and retailers have been busy for several months now readjusting their business methods to meet the changed conditions. This work is now either completed or nearing completion and there are good reasons for hoping and believing that before long business will be on a firmer foundation.

\* \* \*

## CALGARY PASSING PERIOD OF READJUSTMENT WITHOUT TROUBLE

Government Guarantee of Irrigation Bonds is Likely to Have a Very Beneficial Effect And Provide Work—Building Shows Decided Increase

By I. H. HANNA,  
Secretary Calgary Board of Trade.

**CALGARY**—Calgary is passing through the readjustment period without serious difficulty and while conditions are not, of course, as bright as we would like to see them, still there is no reason for pessimism.

There has been some unemployment this spring and there is still a surplus of labor. The recent decision of the Alberta government to guarantee irrigation bonds will result in work on the Lethbridge Northern Irrigation District project being undertaken at once, and tenders have been called for. As soon as this work is started it will, no doubt, give employment to a large number of men.

Crop conditions were probably never better in this part of Alberta than at the present time.

Considerable attention is being given to bonafide oil development and a number of wells are being drilled in southern Alberta and other parts of the province. Reliable men, who are familiar with the situation, are confident as to results in the near future.

So far as building construction is concerned, Calgary building permits for the first four months in the year show a total of \$1,267,800 as compared with \$809,000 for the first four months of last year, an increase of \$458,800.

Several big conventions are coming to Calgary this year and American auto tourist travel from California, Oregon, Washington and other States to the Canadian Rockies via Calgary, together with the usual tourist travel by train, will bring large numbers of visitors during the next few months.

\* \* \*

## WINNIPEG HAS LESS UNEMPLOYED THAN ANY OTHER CITY OF ITS SIZE

Bank Clearings Considered Very Satisfactory—General Prospects Are Very Bright And Building Operations Are Being Carried Out at Good Rate

By W. E. MILNER,  
Managing Secretary Winnipeg Board of Trade.

**WINNIPEG**—Winnipeg is in a very flourishing condition at the present time. The bank clearings which were published at April 30th, read as follows:

|                           |               |
|---------------------------|---------------|
| Month of April, 1919..... | \$153,888,003 |
| Month of April, 1920..... | 188,183,383   |
| Month of April, 1921..... | 206,396,710   |

You will therefore see that our bank clearings for the month of April exceeded those of 1919 by \$52,000,000 and surpassed 1920 by \$18,000,000. Our bank clearings for the months of January, February, March and April, the first four months of the year 1921, amounted to \$785,893,623, while in 1920 they amounted to \$755,536,193, surpassing 1920 by \$30,357,430 and 1920 was the banner year for bank clearings in the city of Winnipeg.

I am quite safe in saying that we have less unemployment than in any other city of a similar size on the North American continent. It is true that we have had a serious drop in the price of wheat, which has been somewhat disappointing to the farmers, but this is not a provincial or a local condition. This is a world-wide condition. Wheat dropped in Chicago, Minneapolis, Omaha, Kansas City and New York markets. These are the leading markets of the United States, and prices have declined to a much greater extent than they have in the Winnipeg market. Wheat has depreciated in value in Australia, England and the Argentine, and we must sooner or later conform to world values.

The prospects at the present time are very bright and the farmers of Western Canada are looking for a good full crop. The reports of the different provincial governments and the agricultural agent of the Canadian Pacific Railway and all the Federal departments of agriculture show most clearly that there has been more land prepared for seeding this year than last. There is no scarcity of seed. There is no demand from the farmers of Western Canada to provide them with seed to sow. Every farmer is well supplied. Labor is plentiful and climatic conditions were never better.

The movement of grain on the railways to the head of the lakes is greater by 1,850,000 tons than it was in 1920, and the C.P.R. and the C.N.R. never operated a season in Western Canada more successfully than the one that has just passed.

There are several divisions along the railways where a snow plow has not appeared on their tracks this year. The equipment has been used to its fullest extent with the result as stated above, in the very greatly increased tonnage.

Our manufacturing establishments have not shut down, not a single one of them. There is more or less of a boom in building operations and there is every reason to believe that the building permits issued by the building inspector will be far in excess of last year.

We are free to admit that in the rural districts in Western Canada that business is not quite so good as it was in 1920, but we regard this as a good omen. It proves to the thoughtful mind that the farmer is economizing and saving to meet his obligations and to have sufficient means to carry on his agricultural operations for the next four months.

\* \* \*

## RECOVERY OF TRADE HAS BEEN SLOW AROUND ST. JOHN, N.B.

Believe There Must be Greater Co-operation on  
the Part of Labor Before Progress Can be Made  
—Some Factories are Increasing  
Working Hours

By R. E. ARMSTRONG,  
Secretary St. John Board of Trade.

SAINT JOHN, N.B.—A survey of St. John business conditions at the present moment shows a feeling among business men that the anticipated upward leap of trade and production is still some distance away. This feeling may be traceable in large measure to strikes and other labor difficulties in Great Britain and the United States and to the general fear on the part of labor that their organizations are imperilled.

This condition is reducing the demand for lumber and other kinds of building material, although it has not wholly put construction work off the map. In St. John, for example, the pressing demand for more school buildings, for hospital expansion, water extension and street improvements, has led to the promotion of construction in these lines, but outside of public works of this character there is little in the way of private building going on. A great deal of repair work that was deferred during the war is being made and this in a way is helping out the general situation. But until labor reaches a better understanding and is prepared to extend more co-operative action, progress in construction and other lines is going to be slow.

Here and there is a rift in the cloud through which a ray of sunshine appears. For example, export demands have caused greater activity in the sugar refining business and the local refinery is now working full time.

One of the cotton mills that was operating on short time is extending its employment hours this week, but the second mill is still on short time. The outlook is reported to be improving.

The nail business is trying to get on its feet and is making some progress in that respect.

The sales tax increases as recently imposed have provoked some criticism, chiefly in the grocery line, but this will doubtless adjust itself later on. While the outlook is becoming a little brighter here and there and buying is on the increase, the general business situation is still depressed to a degree and calls for careful handling.

\* \* \*

## FIVE U.S. FIRMS HAVE GONE TO BORDER CITIES IN THREE WEEKS

Depression Not as Severe in This District as in  
Many Other Centres—Bank Clearings Show  
Increases—Must Get Down to  
First Principles

By F. MACLURE SCLANDERS,  
Commissioner Border Chamber of Commerce.

WINDSOR.—So far as concerns these Border Cities, we are exceedingly fortunate. The depression does not seem to have affected us in any noticeable way. Quite a percentage

of our large retailers recently interviewed by me report a bigger business for last month than they did in April 1920.

Most of our manufacturers who had closed down have again resumed, some of them on full time. On the whole, we have no reason to complain down here at this southernmost corner of Canada. But, we have much reason for gratitude.

It may interest to add that the Americans have certainly not lost confidence in Canada and her industrial possibilities, for within the past three weeks no fewer than five American branch factories have located with us which now gives us upwards of two hundred-and-twenty of such—and they are all doing well.

According to the "FINANCIAL POST," issue 13th inst., the Windsor bank clearings were the only ones in all Canada which indicated an increase. (These do not include the bank clearings for the other border municipalities.) We are apparently less affected by the present depression than any other point.

If in 1913, for instance, we had enjoyed the volume of business that is ours to-day, we should have deemed ourselves wonderfully busy. The trouble with so many of us is that the hysterical activity of the war and the post-war period has implanted in us false conceptions of what is really meant by being normally busy, and has always meant prior to the war. In fact, our present conception of normal standards is really abnormal, and not normal at all. The war is over—a circumstance which, somehow or other, seems to be exceedingly difficult for many to realize; and, in my opinion, things will not be right until we have become reconciled once more to old-fashioned hours, wages and profits—until we have got away from the silk-shirt, patent-boot period, and returned heartily and sincerely to our work. This consummation so devoutly



The New Bride.—"You must remember, dear, it was always understood that mother should come and live with us when we were married."

—Thomas in "World Wide."



to be wished is not, I am respectfully convinced, so remote as many now anticipate.

Automatic law operating through economic exigencies cannot be effectively or permanently impeded by the creation of artificial obstacles.

The operation of this law is as immutable as the rising and setting of the sun; the ebb and flow of the tide. Therefore, our effort should be to strive with all our intelligence to escape as much as possible of the tribulation through which the automatic law in question invariably works; and to this end the exercise of common sense is absolutely imperative.

To revert to the Border Cities—it would almost seem that we are here in a little kingdom of our own and to some extent apart and away from the outer world; and from that outer world, there comes to us, as from a distance, the murmur of things that are so much duller and more disquieting than we here are conscious of.

\* \* \*

## CONDITIONS ARE IMPROVING IN INDUSTRIES ON PACIFIC COAST

Metal Trades Are Down Owing to the Falling Off in Lumber Industry—Other Lines Are Looking Forward to a Better Season

By W. E. PAYNE.  
Secretary Vancouver Board of Trade.

VANCOUVER.—We have it on the authority of a prominent business man of this city, who went East in March last, that he came to the conclusion as the result of his observations, that at no time during the recent slump have business conditions been so depressed here as in other parts of Canada, and some parts of the United States.

Now, referring more particularly to the line which your journal represents, we have to report that the metal trades are at present only working 50 per cent of the capacity of the plants. This is largely accounted for by the fact that the lumber mills, on which the metal trades are dependent for the greater part of their business, are very slack, neither are they having their plants overhauled as is usual in the early part of the year.

However, last year the first five months were very quiet in the lumber industry, and afterwards business picked up to such an extent that the year's total was very large.

As regards fruit canning, although large stocks of jams, etc., are still held, put up when the price paid for fruit was very high, it is probable that as fruit will be obtainable at a much lower figure this year, more than ever before will be canned, as this will enable the canners to average up.

As to salmon canning, only sockeye will be put up this year, and the outlook for that branch of the industry is good.

Mining, of course, is quiet, as it is all over the world, and will be until prices improve owing to increased demand.

The pulp and paper industry is very flourishing and all plants working up to capacity.

\* \* \*

## CONDITIONS IN GUELPH REMAIN GOOD—FACTORIES NEARLY ALL BUSY

Only Two of the Shops Are Closed Down—Diversity of Industry Makes it Possible to Provide Employment—Merchants Have No Complaints to Make

By H. WESTOBY.  
Secretary Guelph Chamber of Commerce.

GUELPH.—There are 126 manufacturers in Guelph and of this number only two have been closed down because of lack of orders, and one of those only in part, the foundry portion still being in operation. Several of the local factories are running on short time, but against this we have a number who are working overtime, so that as a whole, the manufactur-

ing conditions in Guelph are exceptional when one takes everything into consideration.

The merchants of Guelph appear to be all busy and I have heard of no complaints from any of these as to any general slackening up in business activities. The building trade, which is often like a barometer, is unusually active at the present time and a large number of new houses in the city and several important buildings are being erected at the Ontario Agricultural College.

Guelph is exceedingly fortunate, inasmuch as its industries are very diversified in their character and therefore any general slump in business does not very materially affect the business life of this city itself. It is expected that one of the local industries will erect a large, modern foundry some time during the current year, and another industry, if a certain site can be secured, is expected to erect a new factory in this city.

The manufacturers and merchants are hopeful for the future and the general expectations are that business will expand during the late summer and possibly grow into volume again.

## Steel Direct from Iron Ore

AN article published in "The Matin," Paris, by Charles Nordman, presents the claims of M. Basset, who holds that he can produce steel direct from iron ore, eliminating the costly pig iron process.

"At present steel metallurgy all over the world," writes Nordman, "consists in mixing in strong blast furnaces alternate layers of oxide, iron and coke. From the blast furnace at the end of its work we get the pig iron, brittle and unusable because it is loaded with carbon. It is then necessary to squeeze pig iron from its carbon by a second operation—that of converters—which at last gives forth real steel.

"All efforts to produce steel direct in one single operation have, up to the present, failed. When carbon burns in the oxygen of air or iron ore it emits some 2,500 calories of heat per kilogram. When this oxide carbon burns, in turn forming carbonic acid, it emits 5,500 additional calories. But carbonic acid at high temperature, as with air, burns iron, giving the iron part of its oxygen, and it is for this reason that into the blast furnaces must be placed an excess of carbon which will take up more quickly the iron oxygen than the carbonic acid emits in formation, and that is the reason why when one seeks to turn all the mineral in the blast furnace into iron one gets only pig iron.

### Dilemma of Makers

"There is, therefore, this dilemma: To put in the furnace much coal and little air, which gives only pig iron, or to put in much air and little coal, in which case the major part of the iron is reoxidized. For these reasons experts have said that the economical production of steel was a Utopia which could not be realized.

"But Basset has made this dream a reality. Basset reduces the iron oxide by using exactly the amount of carbon needed. This operation takes place—and this is the original idea of Basset—in a chamber having a high temperature, into which is blown powdered carbon and air already raised to a temperature between 700 and 1,000 degrees. This powdered carbon is admitted in quantity to produce in burning, in the heated air, only oxide carbon, but the heat thus emitted, the air being previously at a high temperature, is nevertheless very high, sufficient to assure the rapid and almost complete reduction of the mineral and the production of steel direct.

### Five-hour Operation

"By this system there is realized, in five hours' operation, what takes six times as long in blast furnaces, and its result is that one obtains from the chamber direct a stream of steel formed without an appreciable loss of mineral."

# Machining a Large Gear Blank on the Automatic

Principle of Design—Various Attachments Used—Tooling For Large Gear Blank—Set-up For Long Shaft—Making Bearings Out of Tubing—Tool Layouts For Hubs and Spark Plug Shells

By J. H. MOORE

**H**AVE you ever had the opportunity of looking at any woodcuts of old-time machinery? If you have, then ten chances to one you muttered to yourself something along the same trend as the writer, viz., "How on earth did they ever turn out work with such crude and clumsy machinery?"

In those days, however, the demand for production was not quite so pronounced. In fact it is questionable if they held the word in the same respect as we do in this present era. Automobiles were unknown; there was no need for haste; and in every way conditions were opposite to those now existent. To-day production costs must be kept as low as possible if we are to successfully compete with other similar lines. Hand work, or even slow machine operations are practically a thing of the past. True, assembling is still accomplished by hand, but even there, mechanical moving devices speed up the work. The development of machinery has been nothing short of marvelous. This holds especially true regarding automatic machines. In practically every branch of industry we have machines which have been gradually developed up to the point where every possible movement is completed automatically. Enter a textile manufacturing plant, view the modern equipment used, and you will come out convinced that we live in a marvelous age. Go through an up-to-date manufacturing plant, note the row upon row of different types of automatic machinery, and you will become still more convinced that our machine tool designers have much to be proud of.

In the April 14 issue of Canadian Machinery we presented an article on auto-

matic machine operations as performed on one type of machine, and through the courtesy of the National Acme Manufacturing Co., Cleveland, Ohio, we are now able to present examples of work produced on some of their types of automatics.

## Principle of Design

Both the Gridley and Acme type of automatic, produced by this concern, have four work spindles, these being held in a spindle carrier which is rotated by gears. The carrier is so indexed that the work is brought consecutively into position for the various tools. As all the turret tools are at work on different bars at the same time, it is obvious that the time required to produce one piece is only that necessary for performing the longest single operation, plus the time required for moving the turret, revolving the cylinder one-quarter revolution, and moving the turret slide forward again until the tools are in the cutting position. In some cases, however, the longest single operation is accomplished from the cross slide, and in such case the time required for the cutting off, or forming operation, plus the idle movements mentioned above would be the total production time.

In many cases it is possible to complete a piece in less time than the time required for the longest cut. Take, for example, a long milling cut, which can be divided between the box tools in the first and second positions. In that case the time for the completion of the piece is considerably less than the usual time for box turning, being slightly more than half.

In drilling, three tools are frequently

used in this manner, so that only a trifle over one-third of the time necessary for drilling the hole is required to complete the piece. The feeding of the bar takes place between the first and fourth positions, when the cylinder is indexing (on the smaller machines) and in the first position on the larger machines, the stop swinging out of the way before the tools approach the work.

These machines have eight standard tool positions, namely, four end working tools, two horizontal forming and cut-off slides, and two stop slides working in the second and third positions. With this arrangement it is possible to have two tools working on each of the four bars at one time. This is, of course a great advantage from production standpoint. The only idle or non-productive moments in the style of machines under discussion are the withdrawing of tools, and indexing the cylinder carrying the work spindles. These moments occur at the completion of each piece.

No general rule can be stated as to tooling, or the use of same, as that depends entirely on the nature of the piece. As a general rule the operations performed at first position are forming (with a tool held on forming side), turning, drilling, facing, counterboring, etc., with tools working from the end and held in the main tool slide.

The second position is sometimes as follows: From the end we might have turning with box tools, drilling, reaming, countersinking, counterboring, facing, etc. We might also have such operations as shaving, light forming, burling and frequently thread rolling can be performed at this position.

In the third station, such operations

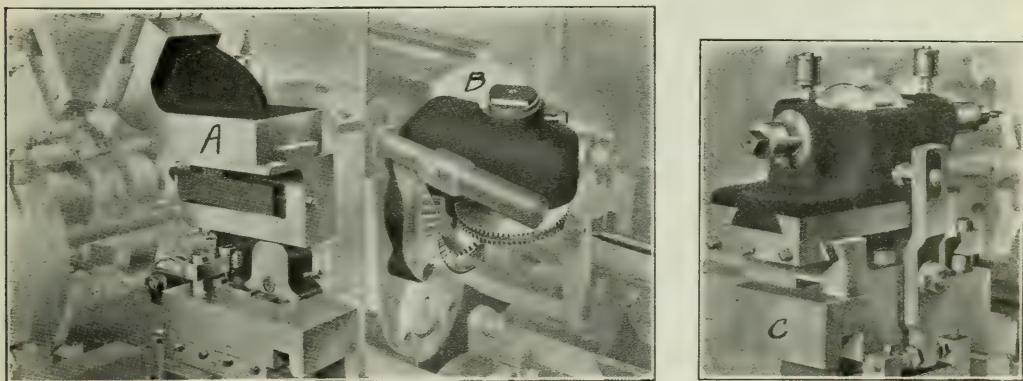


FIG. 1—SHOWING THREE OF THE ATTACHMENTS THAT HELP TO SPEED UP PRODUCTION.



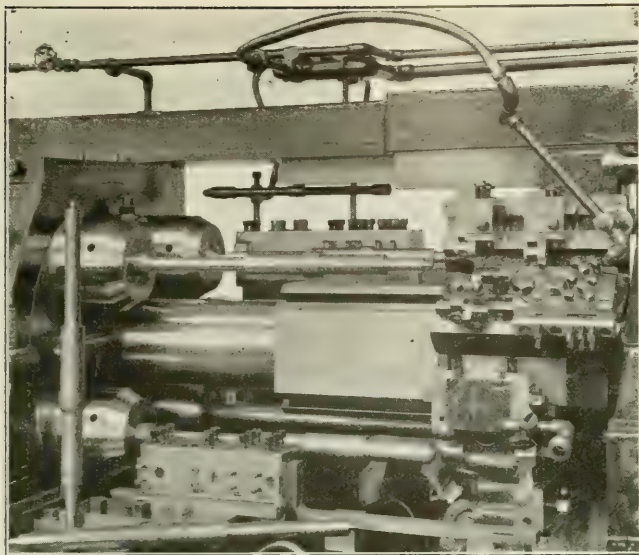


FIG. 4—MACHINING A LONG SHAFT ON A MULTIPLE SPINDLE AUTOMATIC.

as threading (with dies, taps or chasers), drilling, reaming, counterboring, etc., can be performed, while turning with a box tool can be accomplished from the end. This position also lends itself admirably to the use of special attachments for milling, cross drilling, etc., their use being made possible because of the fact that the rotation of work spindle can be stopped in this position for the threading operation. Shaving, thread rolling and knurling opera-

tions are often performed in this position, the tools being held on the top slide, and operated in this position.

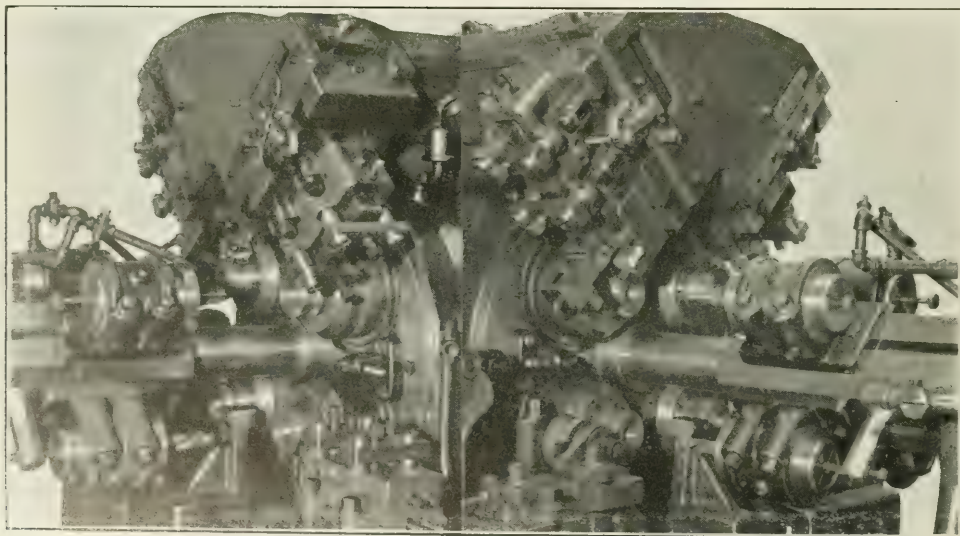
The fourth and last position is used in many ways. The slide working tool cuts the piece off, in some cases after a forming operation has been performed. Tools from the end can counterbore, countersink, ream, recess, drill or turn. In many cases a variety of these stated operations are combined, in order to still further speed up production. The study

of proper tooling on any style machine is a very important one, and the same condition holds good on these machines. By a careful study of the product, maximum production tooling can be installed. In this regard, the company whose machines we are describing lend valuable aid and suggestions.

#### Various Attachments

The labor saving idea embodied in these machines has been carried further, through the use of special attachments. These take the place, partly or entirely, of extra machines of standard types such as milling machines, drill presses, slotting machines, in fact in some cases take the place of special machinery. Such attachments are easily placed in position and save a large amount on the labor cost as they can be used without adding to the production time which would be required, even if the attachment were not used.

These additional production getters cover quite a field, including cross-drilling, reaming, countersinking, counterboring from the side, milling, slabbing, slotting, etc., from both side and end. Fig. 1 depicts three of these attachments. At A is shown an auxiliary forming attachment. When forming cuts are especially heavy, either very wide or deep, it is wise policy to use two or more forming tools. On the Acme type of machine additional forming tools can be used while the first one is cutting, to shorten the total forming time. This method has another advantage inasmuch that the last tool leaves a better finish than a single tool for all forming operations could be expected to give. The attachment shown permits of the use of two or three forming tools, and, when



FIGS. 1 AND 2—SHOWING THE FIRST TO FOURTH POSITIONS IN THE MACHINING OF A LARGE GEAR BLANK.

used, the stock is fed on the cut-off side of machine in the bottom position, which is the usual cut-off position; and the first forming tool is used in the regular cross tool slide. The bar is then indexed to what is usually referred to as the first position, that is the lower one on the forming side of machine, where the second forming tool, in the regular forming slide, completes the rough forming of the piece.

A shaving tool is used for finishing in the position just above the second forming tool; and a special cross slide for cutting off is attached to the top bracket and used in the third (the threading) position. It is supported and operated from the regular side working tool slide on the cutting off side of machine.

One advantage of such an arrangement is the distribution of the strain of heavy forming cuts, but of course the most important advantage is the gain in both production and quality of finish.

Then there is the attachment for slabbing and slotting. This is shown at B, Fig. 1. One, two or three slitting saws or milling cutters can be used on this style of attachment, and they can be set horizontally, vertically, or can be swung to any desired angle in between.

Many parts which are made on screw machines are drilled from the side after being completed on the automatics. On these machines most of the work can be finished, including the drilling, during the making of the part, without adding to the production time.

When the bar is stopped for threading in the third position, the drill performs its work as shown at C, Fig. 1. The drilling tool is held in an auxiliary spindle as shown, and the attachment itself is mounted on the cross slide just above the cut-off tool. The attachment is advanced by the same cam that operates the cut-off slide, and when it is necessary to pass the drill clean through the piece, the attachment is arranged to feed farther and faster than the cutting off slide. The drill spindle is driven from a belt from a special countershaft, or by being coupled to the spindle driving gear in the main tool slide. By the use of this attachment operations such as counterboring, straight or taper reaming, countersinking, from one or both sides, and the drilling of two holes, either of the same or different sizes, can be accomplished. Other similar operations of which there is no need to enter in detail can be likewise performed.

Frequently it becomes possible to combine two of these special operations and to perform both of them at the same time, while the other operations on the piece are proceeding. Where necessary, it is possible to use at the same time two milling attachments, one from the side and one from the end; or a milling attachment from the end, and a drill from the side; or a combined mill and drill from the side, a mill from the side and a drill from the top. Two drilling attachments, one from the side, and one

from the top, can be used, in fact it is not an infrequent arrangement. In addition to the above there are special threading attachments, self-opening dies, various milling fixtures, reaming attachments, special tools, etc. In many cases the use of one or more of such attachments has increased production to such an extent that the original cost has been absorbed in very little time. The chief point to watch is this. Do as much as you can to the piece before it leaves the machine, as quite often small additional operations cost as much, if not more, than the



FIG. 6—STEPS IN THE MAKING OF A SPARK PLUG SHELL.

automatic work on the piece. It is a wise policy to study the problem yourself, then put it up to the makers of the machine, letting their engineering staff, who are specially trained on such work, give you the benefit of their opinion. Leaving the subject of the machines and their attachments, we will next consider examples of work performed.

### Examples of Work

Fig. 2 illustrates the tooling on the first and second positions of a large gear

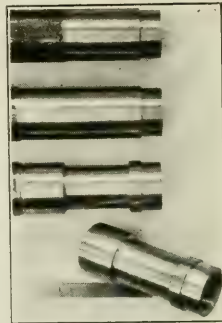
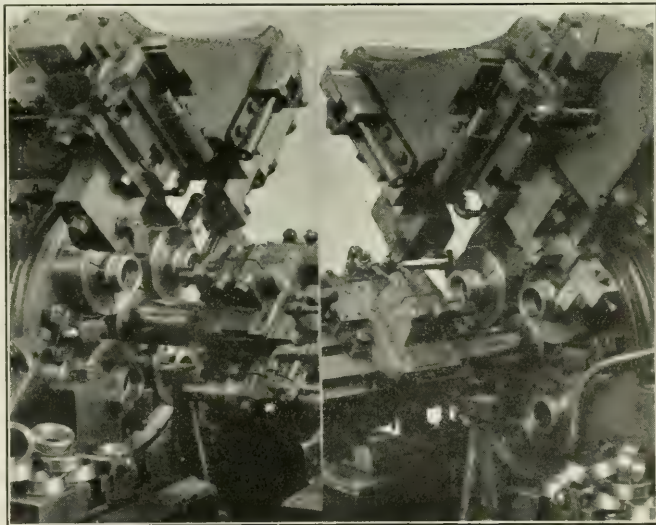


FIG. 7—VARIOUS STEPS IN PRODUCTION OF A MASTER PUSHER.

blank. This photograph also affords a splendid view of the top slide. The opposite picture, Fig. 3, shows the third and fourth positions on the same piece. By glancing at both these views the complete tooling is seen. This blank was completed on a 3¼-inch Acme multiple spindle automatic screw machine of the latest type. Unfortunately we have no production figures on this or any of the pieces to follow.

The next view, Fig. 4, depicts the machining of a long shaft on a Gridley multiple spindle automatic. The photograph shows the tool set up from the forming slide side of the machine, and pieces of this sort are formed, nicked, turned, recessed and cut off simultaneously; as many as 15 or 16 dimensions having been machined on one shaft, all



PRODUCING A BEARING FROM TUBING ON A NEW STYLE ACME MULTIPLE SPINDLE AUTOMATIC.



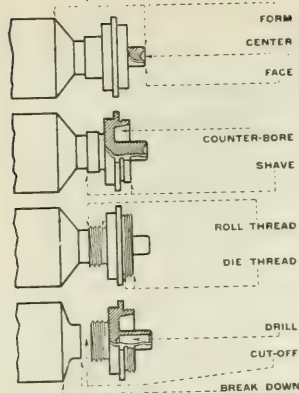


FIG. 8 SHOWING HOW THE PART IS COMPLETED.

at one time. The completed shaft can be noted in the photograph, and when we state that it is about 16 inches long and 1½ inches diameter at its largest point, readers can form the rest of the proportions quite easily. Following is the mode of procedure in machining.

First position—form and turn; second position—finish and turn; third position—finish form and recess; and last position—cut off.

Fig. 5 depicts an interesting job on the new style Acme multiple spindle automatic. This is a bearing job, and tubing is used for the work. First, the part is rough formed, rough bored and faced. In the second position the work is finish formed, rough taper bored, and a radius completed. Third, the part is finish taper bored, shaved and faced. The last position, as usual, is cutting off. Both right and left hand views are taken of

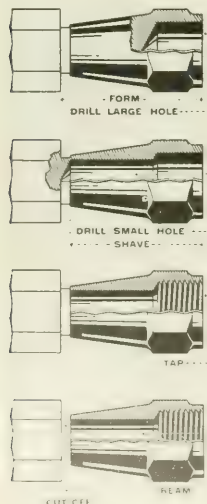


FIG. 9

the same piece and some of the finished product can be noticed resting on the tool slide.

At Fig. 6 are shown the steps in the making of a spark plug shell. First, the part is rough formed and drilled part way. Secondly, it is finish formed, drilled and chamfered. The third position is devoted to tapping, while the last position completes the drilling, also cuts off.

Fig. 7 illustrates the steps in the making of a master pusher. First, the piece is rough turned and partially drilled. Next comes the finish turning, and finish drilling. At the third position the part is formed and reamed, while at the fourth and last position it is cut off.

Fig. 8 shows in diagram form an interesting piece of work. It will be noted that the first position is taken up with forming, centering, and facing, while the second shaves and counterbores. One thread is rolled, and the other cut with a die at the third position, and the piece is drilled, broken down, and cut off in the fourth position.

The piece shown at Fig. 9 is completed as follows: First position—forming and drilling of large hole. Second, the small hole is drilled, and the outside shaved. The third position is used for tapping, while the small hole is reamed, and the part cut off in the last position.

Fig. 10 depicts a hub which is an interesting part to complete. First a hole is drilled half way, and the part is rough formed. Next comes the completing of the hole, and the finish forming of the piece. Third, the part is shaved and counterbored, while in the last position two different diameters are reamed and the piece cut off.

The example shown at Fig. 11 is centered, faced and rough formed in the first position; drilled and shaved in the second; tapped and the thread rolled in the third; while a small hole is drilled

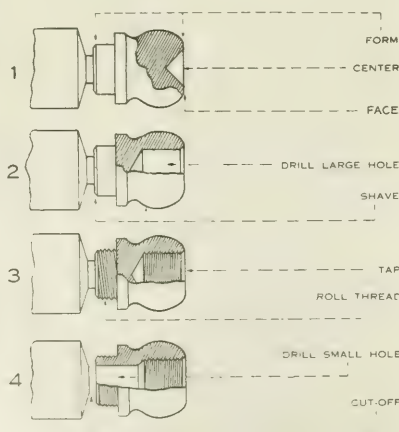


FIG. 11

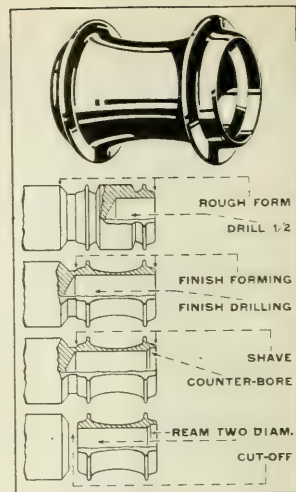


FIG. 10 COMPLETING A HUB.

and the piece cut off in the fourth position.

Fig. 12 is first formed and milled on the end, after which it is formed at another portion, and pointed in the second position. In the third position the part is threaded and milled, while in the fourth position the usual cut off operation is performed.

#### Miscellaneous

On parts which cannot profitably be made from bars because of irregularity of shape, or amount of valuable material cut away, the magazine feed is usually used. The parts in such cases are fed down the magazines, or loaders if one cares to call them that, where they are automatically fed into the spindles and chucked in place. After the pieces are completed they are extracted automatically by means of plungers in the spindles.

In some instances the shape of the piece makes it impossible to feed by use of the magazine. In such cases they are inserted by hand, but when this occurs

(Continued on page 82)

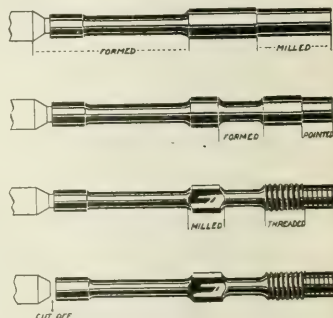


FIG. 12

# Review of Canadian Machinery Drafting Course

Mechanical Drawing Defined—T-Square Practice—Use of Various Instruments—Triangle Exercise—Compass and Ruling Pen Hints—Practice Plates—Uses of the Triangle—Lettering

By J. H. MOORE

SOME time ago Canadian Machinery commenced a series of articles on mechanical drawing. It was our intention at that time to continue these lessons, but other plans prevented. Numerous requests have been received suggesting that we take up these lessons once more, so, for the benefit of those who did not have an opportunity of starting the previous articles, we have decided to review in as brief a manner as possible, the data embodied in the former lessons. From that point on, we shall go further into the subject, taking up later questions in design.

We will endeavor to touch only on the essential points, as we intend making the lessons especially suitable to apprentices and mechanics who desire a grounding in the principles of mechanical drawing. Close study of these articles, should, in an indirect manner, increase your earning power.

## Mechanical Drawing

Briefly, mechanical drawing is the art of showing graphically details of machinery. It is the language by which the draftsman speaks to the workman. A brief study of a well prepared drawing should explain fully the idea of the designer, and if a mechanic understands the principles of mechanical drawing he not only makes his own task easier, but is a help to the designer, in so far as the carrying out of the drawing is concerned.

Not only should apprentices and mechanics learn to grasp the principles involved in mechanical drawing, but they should practise at home, and in the technical school, some simple drawing, leading up later to more intricate work.

Any good grade of paper can be used to draw on, and at Fig. 1 is shown the chief instruments required in drawing work. A shows the drawing-board; B, the T-square; C, two triangles, both 45 degree, and 60-30 degree, while at D is depicted the regular style of triangular scale adopted. E shows a simple style of protractor, while F illustrates some of the instruments used. G depicts the irregular curve and its uses, while H shows the usual method of sharpening drawing pencils. In addition to the above, thumb tacks are used to fasten down the paper. Lead pencils graded from H to 4H are best suited for drawing, and the pencils should be sharpened with a chisel edge as shown at H. In drawing, the student should place the chisel edge against the T-square, or triangle, this enabling him to draw a clean-cut fine line through any points.

The T-square gets its name from its appearance. To illustrate the use of the T-square we have prepared Fig. 2. Always keep the head A up against the left hand edge of the board, otherwise the various lines drawn will not be parallel. For practice proceed as follows: Fasten a sheet of paper to the board and draw

a line B, making this line 6 inches long. Next, lower your T-square a distance of 5 inches and draw another line. Without moving your T-square, project down from the extremities of the first 6-inch line, the two lines, C and D. Use your scale at this point, measuring down a distance of 1 inch each time as shown on sketch. Having done this, use your T-square to produce the lines E, F, G and H. This may seem an extremely simple exercise, but its chief object is to give you control. At first you will find you want to run all over the lines, but keep on until you have perfect control over the hand, making sure that every parallel line touches, but does not run over the vertical lines C and D.

At Fig. 3 is shown an easy method of holding the compass; the correct and incorrect method of holding the ruling pen; also a view of how the hand would appear if held in the proper position. Study these views carefully, keeping the following points in mind. Make sure when using the ruling pen that both blades bear evenly on the paper. If they do, the resulting line will be smooth and even. A common danger is shown at A and B. First there is a tendency to get too great a slope outward, then second, there is a like possibility of coming too far inward. If good work is to be obtained you must hold your pen upright as shown at C. If you follow out this advice, your hand will take the position

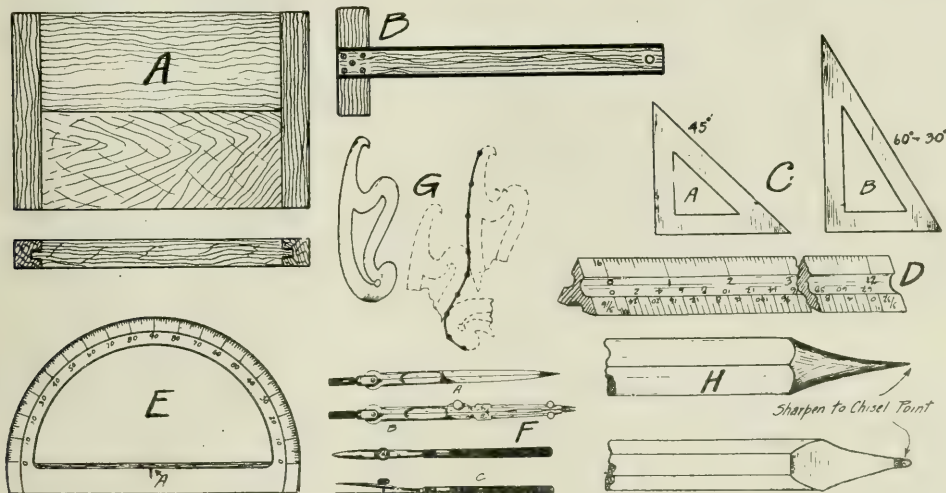


FIG. 1.—A FEW OF THE MORE COMMON INSTRUMENTS USED.



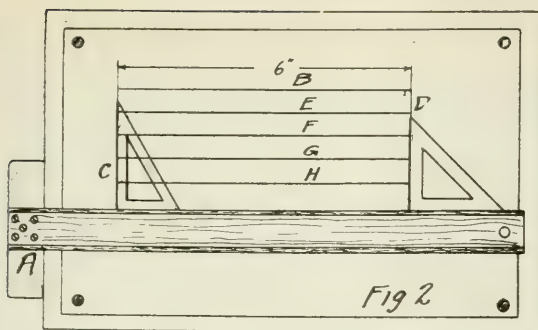


FIG. 2. A SIMPLE LESSON IN THE USE OF THE T-SQUARE.

shown at D. Should you blot quite a bit at the start do not get discouraged. The writer made many a blot before he was able to make a drawing. In fact many a drawing he spoiled in the earlier days. Use only a good grade of India ink.

When you feel you are proficient at exercise No. 2, and you have practised drawing ink lines with the ruling pen, start on the lesson shown at Fig. 4. Work to the dimensions shown; lay out the four sections one by one; draw the various lines; but keep in mind that control of both the hand and instruments is what you are striving for. Stay at the work until you can turn out a neat exercise.

On completing Fig. 4, start on Fig. 5. This plate will give you both pen and compass practice. Another good practice sheet is shown at Fig. 6. This exercise covers various uses of the triangle. Section 1 illustrates a very common use, viz., drawing parallel lines at an angle to the horizontal by means of the T-square and triangle. Section 2 depicts the use of triangles only and illustrates the method of drawing a line

parallel to a given line. First place triangle A with one edge coinciding with the line B C. Next take triangle D and place one of its edges in contact with the bottom edge of triangle A. Hold the

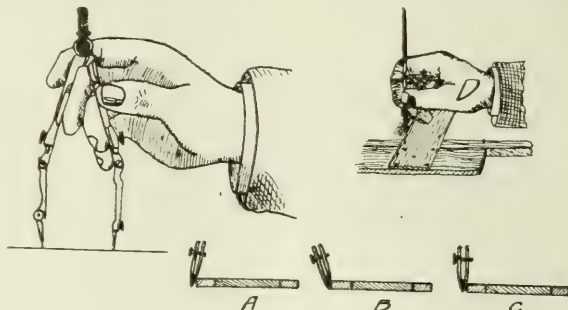


FIG. 3. THE CORRECT METHOD OF HOLDING THE COMPASS AND THE RULING PEN.

triangle D firmly with the left hand and slide the set square A to the right or left as desired, until you reach the point through which you wish to draw the line

to any given line by means of the T-square and triangle. From these little hints students can form some idea of the possibilities of such instruments and by practice will find these tools more useful as time goes on.

### Lettering

When you speak of lettering to the average student studying drawing, if you watch closely you will see his nose curl slightly as he remarks, "Gee whiz—lettering to my mind is a waste of time." But is it? We believe that lettering is as important as the drawing itself, and although we would not suggest that students spend a great deal of time on this subject alone, we do believe that a short period spent in practising lettering will be time well spent.

Fig. 7 illustrates how students can practice what is known as the plain Gothic style of lettering, with the aid of the T-square and triangle. To start with, use only a good pen nib. A Gillott No. 303 is ideal for such work. For illustrative purposes we have shown a few dimensions that can be followed. Make capital letters 5-32 in. high, and the smaller, or lower case letters as they

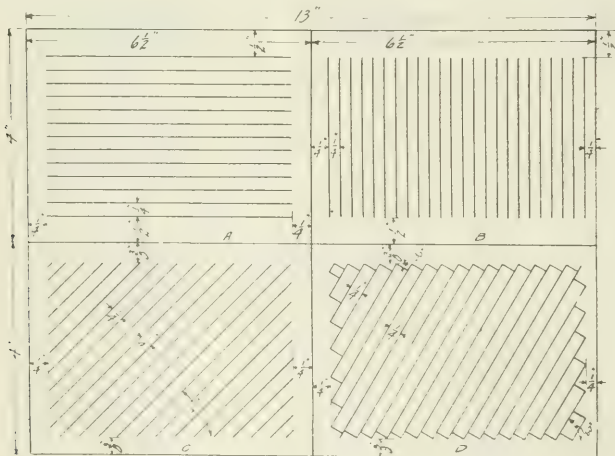


FIG. 4—A PRACTICE PLATE FOR CONTROL OF THE RULING PEN.

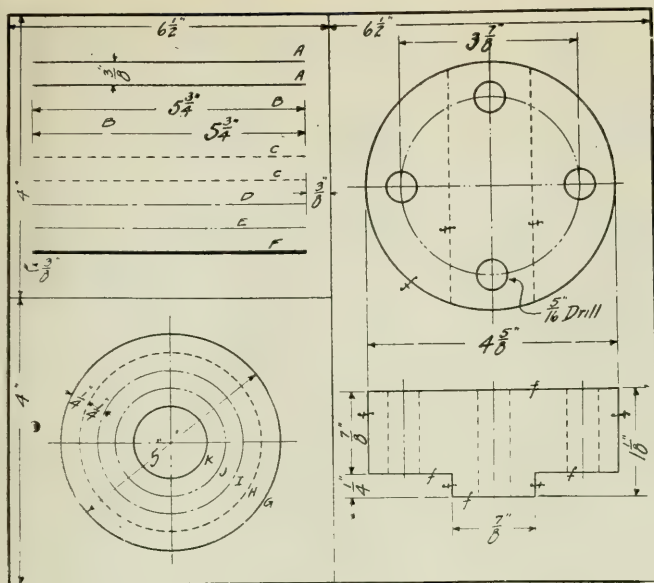


FIG. 5—THIS PLATE WILL GIVE YOU BOTH PEN AND COMPASS PRACTICE.

are called,  $\frac{1}{8}$  in. high. No definite rule can be given as to the spacing horizontally, but practice soon makes you more proficient in judging what is good spacing. What would perhaps help more than anything would be to remember that W is the widest letter, M and T the next widest, then A and B. The narrowest letters are I and J, after which all the rest are about equal.

Before beginning to letter, draw horizontal guide lines with the T-square to serve as a guide for the tops and bottoms of the letters; see lines A, B, C and D. The various letters should be made to extend fully up to the top, and down to the bottom. They should not fall short of the lines, for if they do the lettering will appear rough and uneven. It is also important that the letters have the same inclination. For example, in the first line of lettering in Fig. 7, the letters A, B, C, D and E have the same inclination. F, G, H, etc., are

alternately placed at various angles, with the result that the appearance is very uneven. Some of the letters have also been prepared to illustrate the importance of touching both top and bottom guide lines.

To secure the regular slope, use the T-square and 60 degree triangle as shown in sketch. In lettering, make the backs and sides of the letters parallel with the sloping lines produced by the triangle. Here are a few hints regarding lettering. Never be over hasty. On line three, Fig. 7, are shown a few letters enlarged twice the actual size. To produce the letter A, draw the center line at the regular slope. From the apex draw a line almost perpendicular as shown, making the distance across the bottom of the letter about 3-16 inch. Regarding the other letters illustrated, by studying the same, students can easily grasp the style and proportion. Follow the copy closely, keep on practising, for you can learn more about lettering by actual practice than by any written instructions. The latter part of Fig. 7 shows the complete alphabet, both capitals and lower case together with a set of numerals 1 to 0. In our next lessons we will go further into lettering, section lining, and other subjects.

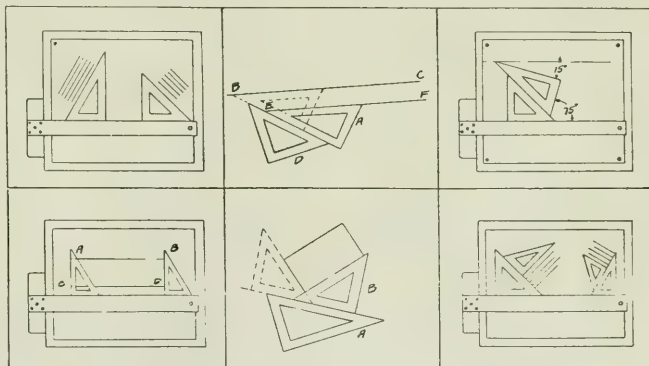
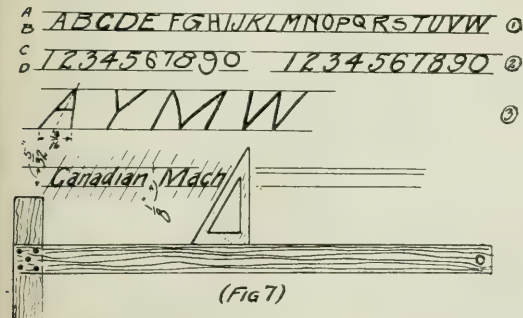


FIG. 6—AN EXERCISE COVERING VARIOUS USES FOR THE TRIANGLE

**A B C D E F G H I J**  
**K L M N O P Q R**  
**S T U V W X Y Z**  
*a b c d e f g h i j k l m n*  
*o p q r s t u v w x y z*  
**1 2 3 4 5 6 7 8 9 0**



(Fig 7)

FIG. 7—TO LETTER PROPERLY AND NEATLY YOU MUST PRACTISE. KEEP AT THE TASK UNTIL YOU MASTER THE ART.



# Making It Harder for a Man to Get Injured

Carelessness is the Hardest Thing to Eliminate—Prompt Attention Given to Minor Injuries is Sure to Cut Down the Off-Work List—What Some Firms Are Doing in This Line

By JOHN T. ORR, Assistant to Superintendent, Toronto Works

**T**HE chief point to watch in any safety device is to actually make it harder for the man to get injured. In speaking on the subject of "Safe-guarding Machinery," Mr. Orr brings this point out nicely, for in the final analysis it is the employee who is safeguarded, and it will be to his benefit more than to the company, where installations of safety guards are effected. But let the author tell his story in his own way.

Our company for many years has been working with the definite purpose of eliminating all hazardous work, and where a mechanical device is the cause of the hazard, a guard is promptly installed. The effort applies not only to safety attachments on machinery, but a protection to hazardous areas, open spaces, stairways, strong chemical gases, smoke, heat and dust.

Let us divide the types of safety devices into three classes, or let us consider three types of hazards that have to be met in a plant of this nature.

First is the hazard of defective material, overstrain, or wear.

Second, carelessness on the part of the operator, which might be due to sheer carelessness, fatigue, or illness.

Third, carelessness of other people, or purely dangerous conditions where a slip or misjudgment would result in accident.

Referring to hazards of the first type, these would likely come from belting or transmission machinery, elevators, hoists and equipment of a like nature. Belts are guarded by steel troughs or cases made strong enough to retain the belt in case of breakage. Emery wheel belts, lathe belts, belts to drill presses, wherever in an exposed position are protected in this way. All drive chains, sprockets, gears and other moving parts which are in any way likely to be a source of danger in their ordinary operating position or in case of their breakdown are encased in metal guards.

The guarding of emery wheels also would fall under this classification. These are guarded by a metal casing covering as much as is practical of the wheel, according to the different uses to which the wheel is subjected. In a general way, however, cast iron guards are used for guarding wheels to no greater than 14 inches in diameter, beyond which diameter, steel guards are used. All guards are sufficiently strong to retain a wheel in case of bursting.

The second cause of accidents is possibly one that requires the most careful consideration, and the greatest amount of thought. The chief danger to oper-

ators from this source is to be found in the design of the tool that they are expected to use. Jigs and fixtures should be made as far as possible fool proof from a safety standpoint, as much as they should be made fool-proof from the standpoint of the inspector. We can generally find in studying the design of simple tools that some are quite safe to handle, whereas others performing the same work are the very opposite; this is particularly true of punches and dies. We might surround our punch presses with patent safety devices, be as careful as we can in training our operators, but the greatest amount of safety lies in toolage which itself is not dangerous.

We cannot always, however, design our machine toolage so that it is so safe it is impossible for a person, no matter what foolish thing he may do, to get hurt, hence we must have in addition to carefully designed tools, other means of preventing a careless or inexperienced operator from being injured, and we put safety attachments of various sorts on our presses, guards, shields, safety sliding blocks, etc., etc., in combination with our tools to make them as much as possible fool-proof.

Accidents from the third source, while not so common, still always present a certain amount of danger, and in consequence must be guarded against. Rubber or cork matting in front of wood-working machines, posts and steel fencing to prevent truckers from coming in contact with operators, proper lighting and shielding of the steps, and floor openings; proper overhead protection, when there is any possibility of danger in that direction, and what is perhaps one of the best safeguards against a large number of accidents is a good general lighting system, in addition to the individual lights required at each machine.

In consequence of this work on the part of the company, the number of serious accidents is encouragingly small. In a plant with at times as high as three thousand employees, there is a very heavy turnover, with a consequent large number of "green" men. Our statistics show that it is the new man who is the cause of our greatest accident expense, and it is to him we direct all attention and educational effort.

On his signing up for employment, the new man is handed printed matter comprising our factory rules, industrial council constitution, employees' benefit society by-laws, and special literature directing his attention particularly to the necessity of safety to himself and to his fellow employees. Suggestions are

given how this safety idea may be advanced by him to his own benefit, as well as making him acquainted with the fact that we have a medical director in charge of the first aid and fully equipped factory hospital, together with nurses for outside visiting service.

In addition to this, all men at the time they first come on the job are instructed in the hazards of their work and are warned of possible dangers by the foreman, gang boss or set-up man.

With a plant having its machinery and dangerous places guarded, there is no assurance that accidents will be entirely eliminated, as our records inform us that the larger portion of the injuries attended to by our medical department are the result of carelessness or thoughtlessness on the part of the individual, and only a very small percentage of the compensation cases recorded can be avoided by mechanical safety devices.

## Skilled Trades

The diversified nature of the work in our plant calls for skilled men in a large number of distinct trades, such as moulders, core makers, foundry men, smithy drop forge and furnace men, punch press and heavy duty, die and punch work, machine tool and all kinds of wood-working operations, skilled metal trades, machine and bench work and painters.

All of these men are subject to hazards peculiar to their trade class, and so that we may have the best thought on the subject, we have not only our master mechanics' department, which is responsible for the installation and moving of all machinery, as well as the erection of safety guards, but we also have a safety representative in each shop who reports conditions to the employees' elected representative for his division which leads up to a safety and sanitation committee of our industrial council, consisting of four members, which puts into effect direct and indirect recommendations.

In our foundry constant effort is put forth to insure sound practical shoes worn by the moulders, and to facilitate this, we have on sale at cost price, a supply of these shoes for our men. We also are establishing the use of canvas leggings for men pouring iron, together with the use of goggles by men at the cupola.

In machine shops, all pulleys, belts, shifting levers, etc., are guarded and projecting set screws are eliminated or covered with safety collars.

## Education

Our experience is that education is the greatest influence in the factor of safety.

May 26, 1921

We begin with the employee on his becoming associated in our work and continue it through to the foreman. A good live foreman, appreciative of safety, will take a personal interest in his department with the view of eliminating as much as possible all accidents charged up to his work. Where there is a safety hazard, he will immediately have it guarded; where he has a careless employee, he will take corrective measures. In addition to personal literature, we have special safety notice boards placed at the main factory entrance, as well as at strategic points in many of the departments. We find these boards are read constantly by our employees, and as the printed matter is changed in every department every week, the interest in safety and personal health work is sustained.

#### Fire Hazard

As many of you know, a considerable portion of the machines manufactured by our company are comprised largely of wood, in the handling of which not only in our outside lumber yards, but in the various primary, assembling, and finishing departments there is an acute fire hazard. It has been the policy of our management for a great many years to spend considerable sums in fire prevention devices, such as sprinkler and hose systems in order that there will be no possible chance of the plant being destroyed by fire. Notwithstanding all of these precautions, there is hardly a day goes by but a fire is reported, but it is usually in one place, namely, shavings distributed at the mouth of the furnaces heating our boilers. In the plant which has been in Toronto for over forty years, and working under these conditions, and not having a fire other than that which has been referred to, this is considered

a splendid record. We are quite proud of this record, but are not letting up at any time in our protective measures, as our fire chief or his assistant is on duty day and night. We have day and night watchmen and a specially trained fire-fighting crew who are located in our fire hall quarters, on the factory premises.

#### Shop Cleanliness

For a shop handling the class of work which we do, a very presentable appearance is shown and while we know there are plants with straight line production and less variety of work going through than we have, they as a consequence may show a cleaner and more orderly appearance, we are always striving to not only eliminate waste, but to get rid of waste and keep our grounds and buildings in a clean and orderly manner, and have all work in process move along naturally.

#### Employees' Suggestion System

In addition to our own employees' suggestion system, where we give bonuses for practical suggestions, for safety as well as mechanical improvements, we have the benefits of regular visits of the inspectors of the Industrial Accident Prevention Association, with whom our safety engineers heartily co-operate. As recommendations are made, they are installed as promptly as circumstances will permit, and anything which will be helpful to the safety and good health of the employee is welcomed.

Our business at this particular time is not as pressing as it has been during former years, but there is absolutely no let up on that account in our efforts on behalf of the employees or the installation of safety devices.

As a matter of interest, might I quote some figures showing our accident sta-

tistics for the past two years, and during the past few months.

|  | Jan. 1919 | Jan. 1920 | Jan. 1921 | Mch. 1921 |
|--|-----------|-----------|-----------|-----------|
| Average attendance .                             | 2211      | 1686      | 1689      | 1500      |
| Total monthly attendance                         |           |           |           |           |
| First Aid . .                                    | 1618      | 1259      | 1352      | 1409      |
| Compensation lost time .                         | 17        | 10        | 8         | 10        |
| No lost time .                                   | 4         | 3         | 5         | ..        |
| Days lost on all cases during month              | 396       | 187       | 108       | 169       |
| Average days lost time per case in month . . . . | 15        | 11        | 8         | 10        |
| Total compensation Expense . . . .               | 1901      | 1154      | 1424      | 758       |
| Injuries per 100 employees                       | 27        | 13        | 8         | 21        |
| Compensation cases per 100 employees             | .95       | .77       | .76       | .67       |

Where we have 13 new accidents each day of more or less minor injuries, such as cuts, burns, bruises, etc., the number of compensation cases arising therefrom in each month is very small. In all cases of injury resulting in a compensation case, an immediate investigation is made and reported upon by the foreman of the department. This report is made to our medical director covering all phases of the situation, the employee, the work, and the scene of the accident with recommendations for future preventive steps. Such a report being demanded of, and prepared by the shop foreman, brings home to him personally his individual responsibility for the safety of the employees under his care, together with the hazardous conditions in his shop.

#### Policy

In closing, let me say that the Massey-Harris Co. is entirely behind the safety movement. It has always been our policy to take care of the good health and welfare of our employees without introducing any spirit of paternalism, and the results we have obtained during the past few years since the inception of an active first aid department for working employees, together with a nurse to visit employees who are ill, or their families, and the recent appointment of Dr. Herbert W. Baker as our medical director is bringing out the highest results in the way of co-operation and better feeling between the management and men.

A new type of plug has been placed on the French market. It is called the Bougiver, and has a glass insulator. The glass is run into the body of the plug when the latter is at a high temperature, and the joint thus made is said to be compression-tight. The insulator is also peculiar in that it completely fills all the space right down to the plug points.

## BIG ADVANCES HAVE BEEN MADE IN LOOKING AFTER THE EMPLOYEE

THERE have been big advances made in keeping men at their work. We do not mean by this that anything has been done to prevent them laying off, but much has been done toward making them more fit for their work every day.

A few years back and little was known of medical practice in the shops and there are only a few of the larger concerns that have gone into this matter.

When a man took a piece of bark off his finger he used to stick it in a can of turpentine and then try and forget it. If dirt and foreign matter generally got into the cut, it was all part of the day's work. If necessary, a search might be made for some chap who generally had a little piece of black, flesh and pink court plaster in his hip pocket.

There is no doubt that years and years have been worse than lost to men because their injuries were not promptly attended to. A mechanic needs the use of every joint in his hands and fingers and any move that can help him retain these faculties to the highest degree deserves commendation.

In these articles we are showing what the Massey-Harris Co. are doing in this direction. The manner in which the equipment is arranged will be of interest and value to manufacturers generally who have these problems to face and the attention given to safeguarding those who work in the premises is also commendable.



# Some Various Examples of Turret Lathe Practice

Machining a Clutch Gear—Two Operations Required—Producing a Large 315 Pound Steel Spindle—Some Special Tools—Machining Spoked Hand Wheels—Profiling With Cross-Sliding Tool

By A. H. Lloyd, B.Sc., M.B.E.

IT will no doubt be remembered that on February 3, February 17 and March 24 we published various examples of turret lathe practice as adopted by the Alfred Herbert Ltd., Coventry, England. In this the last part of the series, we will take up other interesting work completed on this particular style of turret lathe.

A rather good piece of work which shows the ability of the modern turret lathe to rough out at a rapid rate, yet finish accurately to size, occurs in the machining of a clutch gear, which is a component part of several of the "Herbert" turret lathe headstocks. The layout for the first operation is shown at Fig. 1, and this operation is being done on a "Herbert" No. 9 combination turret lathe. The rough material is a drop forging of 40 tons tensile strength, the largest diameter of which when finished is  $7\frac{1}{4}$  inches; the overall length being 4 inches. At the first operation the forging is gripped with special jaws on the boss, an end location being obtained by lengthened screws in the chuck jaws. The first tool is an inserted cutter drill with oil supply. In this drilled hole, counterbore No. 2 pilots and roughly opens out the ball race diameter. Tool No. 3 is a rough facing tool for the end, which operates simultaneously with No. 4, which is an adjustable knee turning tool carrying a counterbore for the large bore, a rough turning cutter for the outside diameter, and a chamfering cutter. By grouping all these cutters together so that they work at the same time, the most economical cutting speed can be employed. For instance, if the large counterbore had been used on station No. 2 and the small counterbore in the knee tool, it would have meant running both

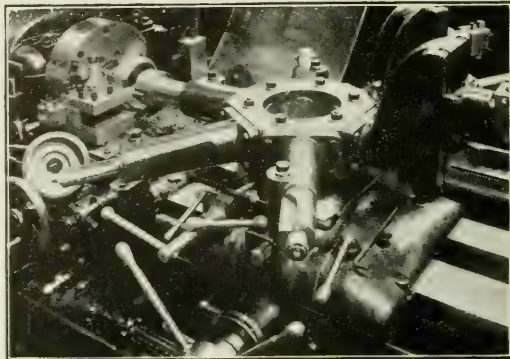


FIG. 2 PHOTOGRAPH OF THE FIRST OPERATION ON CLUTCH GEAR.

on the speed determined by the large diameter. No. 5 takes finishing cuts on surfaces similar to those operated on by tool 4; that is to say, finish boring the ball race, finish boring the large diameter, and finish turning. Simultaneously with this tool, No. 7 from the back of the cross slide is brought in for finish facing the end, and chamfering. No. 6 is a special tool holder in the square turret, carrying three cutters for facing the bottom of the bores and undercutting. No. 8 is a floating cutter bar for sizing the ball race diameter, and No. 9 a similar tool for the large diameter.

Fig. 2 shows a view of the machine set upon the first operation, and the piece as it leaves the chuck. During the operation of the large counterboring tool, the cut is very heavy just at the end of the travel, and tests the gripping quali-

ties of the Coventry chuck very thoroughly. It will be noted that both counterbores, in addition to the drill, are provided with oil tubes for conveying the lubricant to the cutting edge, thus enabling them to work under the most efficient conditions. The machining time for the first operation is 21 minutes.

## Second Operation

In considering the second operation on this piece, we shall have an opportunity of going into a lay-out of tools for an automatic machine, known as the "Herbert" No. 5 auto lathe. This machine is in reality a turret lathe for dealing with detached pieces, on which all cutting operations proceed automatically after the work has been chucked. When the cycle is completed, the machine

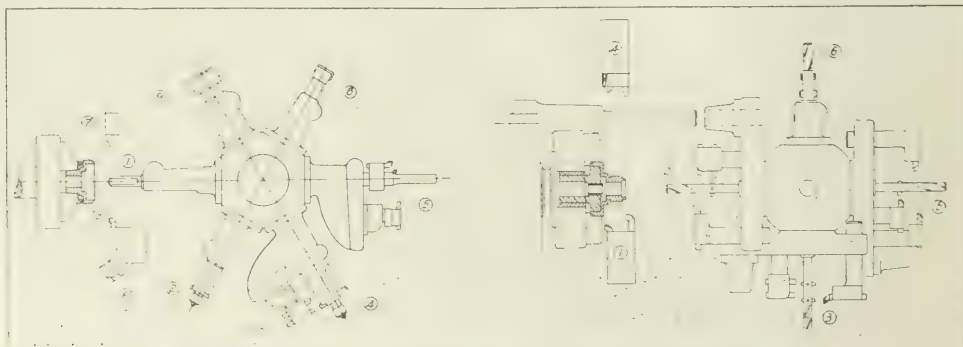


FIG. 1—LEFT HAND VIEW—SHOWING TOOL LAYOUT FOR CLUTCH GEAR.

FIG. 2—RIGHT HAND VIEW—THE SECOND OPERATION ON THE SAME PIECE.

stops automatically, a new piece is put in the chuck by the operator, and the machine is re-started. It is possible, therefore, for one operator to attend several machines, so that the labor cost per machine is very low.

Fig. 3 illustrates the lay-out for performing the second operation on the No. 5 auto lathe. The work is chucked true by a locating plug fitting in the chuck, which acts also as a steady bush for the boring bar, the work being gripped by soft jaws. No. 1, the front tool post, carries a pair of cutters for rough facing the large shoulder and the end. Simultaneously with the facing, a combination tool comes on to the work. This carries three turning cutters for the various diameters, and a boring bar with a cutter for opening out the second ball race. The tools on this turret face are timed to finish simultaneously with the facing tools. When this combination is working, it is obvious that as the cutters come on to the work successively, it is an advantage to vary the feed, in order to obtain maximum production. This particular lathe is provided with a valuable feature whereby the feed can be altered automatically during the cut, which thus enables the tools to start cutting at a coarse feed and change over progressively to finer feeds as the depth of the cut and the duty increases. No. 3 is a second combination tool, carrying finish boring and finish turning cutters. This operates simultaneously with No. 4, which is the standard back tool post in which are carried a gang of finish facing and grooving cutters. No. 5 is another combination tool, carrying a number of cutters for forming the various radii and chamfers. No. 6 is a floating cutter bar with two cutters for sizing the ball race and small bore simultaneously. The time for the second operation is 12 minutes.

At Fig. 4 you have a close-up view of the machine on the second operation, and it would be well to note the overhead support or pilot used, which is a very valuable feature on work of this

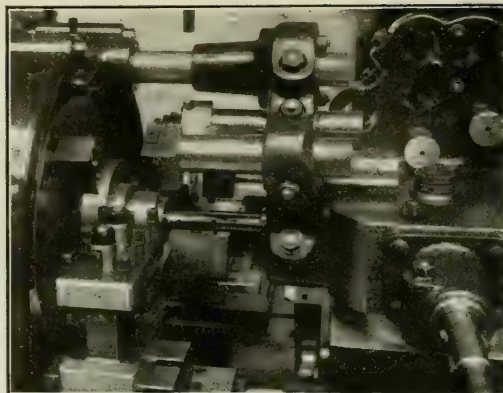


FIG. 4—CLOSE UP OF THE SECOND OPERATION ON CLUTCH GEAR.

class. It consists of a bracket bolted to the headstock which carries a steel bar 2 1/8 inches diameter. On each combination tool there is a pilot bush attached by three studs in clearance holes, so that the bush can be aligned true with the overhead bar. You will appreciate that this arrangement ties up the turret slide to the headstock very rigidly, and enables coarser feeds to be used and a greater accuracy to be obtained than would be possible without it. In many establishments large forgings are machined on ordinary lathes without considering the possibility of the turret lathe on this class of work. This lack of consideration is often attributable to a casual impression that the forgings are too large and heavy for the turret lathe, or because there might be difficulties in chucking owing to the overhang of the work.

The next photograph, Fig. 6, shows the first operation set up for machining the spindles used on a No. 9 combination lathe. This piece is machined on a No. 20 combination lathe, and is quite large, being 10 inches finished diameter on the

flange, and 3 feet 2 inches overall. The forging, which is made of .5 carbon steel, weighs 315 pounds in the rough.

In order to facilitate chucking at the second operation, it is necessary to machine the flange practically right across at the first operation; the available grip, therefore, for the first operation, is exceedingly narrow, and varies from 1/4 inch to 3/16 inch, the overhang from the chuck being 38 inches. Even with this overhang the work is quite rigid, as will be seen from the nature of some of the tools, which are used without a support.

The operation is commenced by starting the hole with a short drill in a combination tool, which also turns a short way up the end to start the roller steady turners. Simultaneously with this operation, the superfluous metal is cut off the end with a tool in the square turret. The roller steady turning tool is then applied to the end, this turner being mounted on a suitable extension piece. At the same time, a tool in the square turret rough turns the portion of the spindle nearer the chuck. Having turned

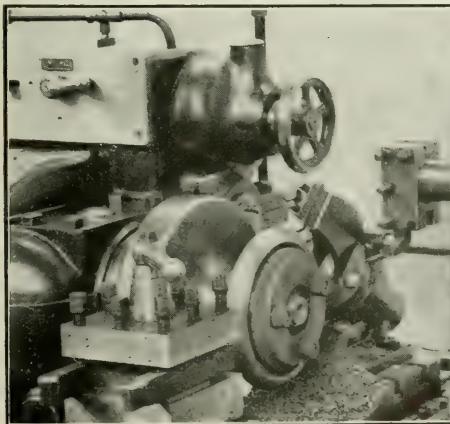


FIG. 6 MACHINING SPOKED HAND WHEELS.

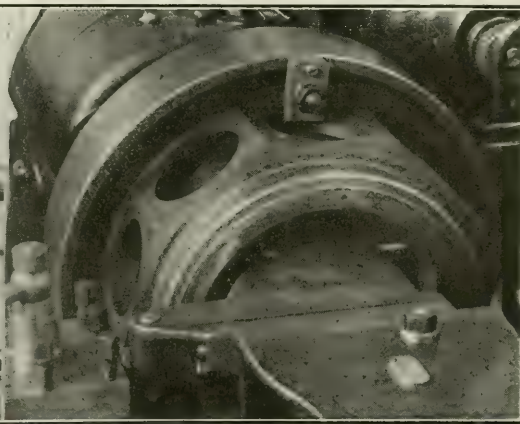


FIG. 7—PROFILING BY MEANS OF A CROSS-SLIDING TOOL.



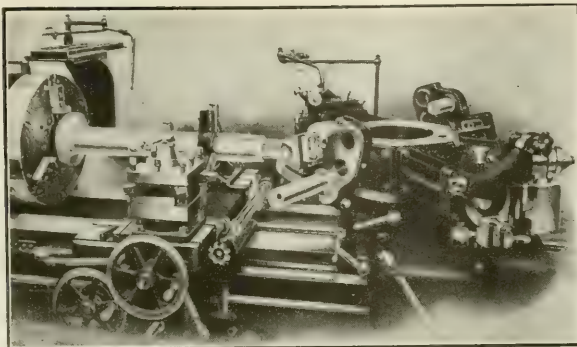


FIG. 5 FIRST OPERATION ON LARGE SPINDLE.

the end, a three point roller steady is brought into position, whilst a  $\frac{3}{8}$  inch diameter inserted cutter drill is used. The feed of this drill is about  $\frac{1}{2}$  inch a minute. Other tools in the square turret are used for undercutting for grinding, and for turning and facing the flange.

The hole is not drilled right through at the first operation, and at the second, the work is gripped on the flange in soft jaws, the reduced diameter going into the spindle, where it is steadied by a bush fitting in the spindle bore. The second operation consists of drilling to meet the hole produced at the first operation, and facing. The time for the first operation is about  $1\frac{1}{4}$  hours, and for the second operation three-quarters of an hour. During the two operations about 220 pounds of metal are removed.

Whilst on the subject of machining forgings, it will not be out of place to draw attention to a point which must be observed in turning forgings with the roller steady boxtool or roller steady turner. Tools of this kind cannot be brought straight on to a rough forging without a preliminary truing operation. In dealing with the spindle you possibly have observed that the roller steady turner was given a true start by having the end of the spindle turned up a short distance with a combination tool which came on to the work just after the starting drill. This is quite satisfactory where the work has a hole, but in the case of a solid article, other means have to be adopted.

#### Some Special Tools

Having considered some representative lay-outs, we will next take one or two examples of quite special tools which deal with the unusual operations. The next photograph, Fig. 6, shows an arrangement used for machining spoked hand wheels for operating machine tool slides. By means of this lay-out, practically the whole of the machining is completed at one operation in very good time. The casting was held on a special fixture, being gripped between two plates under the rim. Before tighten-

ing up the three nuts, the boss is located central by bringing up a cup centre carried on the turret. The drilling, boring and reaming of the boss are straightforward operations, but for turning the radius on the rim a very interesting tool is made use of.

This machining is done with a cutter in a tool post carried at the end of a swivelling arm, fitted to a spindle mounted in a bracket on the back of the cross slide. The spindle is made to revolve by means of a pinion cut solid with it, and operated by rack teeth cut on a round bar extending from the combination tool. The cross slide is brought forward to a stop, the rack engaged with the pinion, and the automatic movement of the turret slide then imparts the feed to the tool. At the end of the forward travel, a chamfering tool finishes the edge of the rim. When not in position, the rack is carried round by the turret like a boring bar. This hand wheel is 9 inches diameter and is finished in  $9\frac{1}{2}$  minutes.

The method of profiling by using a cross sliding tool mounted on the turret and guided by a former on the cross slide has been described in connection with the pump body job, and an elaboration of this occurs in one of the operations on the "Le Rhone" aero-engine crankcase. The internal surface of this is spherical, and, owing to the fact that it is interrupted by the holes for the cylinders, must be machined by a single point traversing tool. The tool employed is shown in position at Fig. 7. The tool holder is lipped to provide a good support for the tool, and the moving slide has an additional support on a square swivelling block carried on the pilot bar, which fits a machined slot in the front slide. In this case you will notice that the former in the square turret is double sided; in other words, it is a curved slot in which the guiding pin travels to determine the path of the cutting tool. The reason for making this former double-sided was due to a certain amount of apprehension on the part of the tool designer, who consid-

ered that there was a possibility of the tool being dragged by the top rake into one of the cylinder holes, with a consequent nasty smash. Whether this danger was a real one is a debatable point, but the method of making the former double-sided certainly avoided the risk.

In considering these various lay-outs which have been presented, you will notice the large extent to which the standard tools are used, and the difficulty in getting good results from capstan and turret lathes is now much less than formerly, since makers of this class of lathe are in a position to furnish standard tool outfits of wide general utility, which reduce the outlay on special equipment to a minimum. Despite this, the necessity for special tools will always exist, and the ingenuity of the designer will be taxed to meet special conditions. The time has undoubtedly come when it is appreciated that turret lathe tool design and practice is a subject which is worth all the attention which can be given to it, and that the tool designing and planning engineer has a big place in the scheme of production. The success of any lay-out or combination of tools is dependent on the sound judgment of the designer, and this, in turn, can only be based on past experience and familiarity with the best shop practice.

#### MACHINING A LARGE GEAR BLANK

(Continued from page 74)

the feeding and chucking can be said to be semi-automatic, while the other movements still remain fully automatic.

Where there are no threads to cut a plain machine will perform all the other operations possible on the standard type with the exception of threading, and other operations when the stock is held stationary, such as cross-drilling, slabbing, slotting, milling from the side, etc. A plain machine is usually found ideal on such work as rollers, pins, bushings, washer work, and such like parts.

Where the parts are very simple, two or three pieces can be completed at once, in other words eight or twelve pieces can be in process at one time, two or three to each bar. From this it will be readily seen that the quantity possible to be produced on such machines is very largely dependent upon the man in charge. If he is up to date and anxious to increase his production, he will study his tooling, improve it where he can, use auxiliary attachments wherever possible, and in every way try to keep his machines running to full capacity. Thus, two operators running a battery of similar machines might secure very different results.

# The Need of Medical Service in an Industrial Plant

The Idea is to Keep Men on the Job by Doing Away With Needless Time Losses by Reason of Neglecting Injuries—How the Idea of Safety is Being Taught

**A**BOUT six months ago the Massey-Harris Co. started a movement to extend the system of first aid and safety work they had been doing, and as a result they have today a much more complete medical service than they have ever attempted in the past. Dr. H. W. Baker is in charge of the medical department, spending nearly all of his time at the Toronto works. At the Weston works an experienced first aid man is in charge. At Brantford they maintain a service by a local doctor, E. A. Smith, M.B., who is at the works each day from 9.30 to 11.30. A graduate nurse and a secretary are also on the staff at Brantford, while a graduate nurse does first aid work and keeps statistics at the Verity Plow Co. in the same city. A medical officer also devotes part of his time to the work at the Bain Wagon Co., in Woodstock.

An official of the company, speaking of the work undertaken along these lines, stated that: With the reorganization, we have taken the view more strongly than ever that this is not a charity work but a good business proposition by which the employee and employer benefit. We taboo the word "welfare" because it savors of charity. We are here to give service to the employee and to do all in our power to make him more satisfied with his job.

We have established a department in each of the five factories, with a staff as charted in Fig. 1.

At the Toronto works, with about 2,000 employees, we have five rooms.

1. A small waiting room, small because it is our policy to have no one kept waiting.

2. A ward equipped with two beds and

a couch. This room is used for men when they become ill or in cases where we are waiting for the ambulance to transfer them to the hospital.

3. An operating room. This is a room 14 feet x 18 feet, well lighted by six southern windows. Four electric lights for dark days do away with all shadows. This room is equipped to do all emer-



Staff of Medical Department at Massey-Harris Toronto Plant. Left to right: Miss Dempster, Miss Cooper, Dr. Baker, Miss Hill, Miss Edwards.

gency work. We have two chairs raised seven or eight inches from the floor, with a glass covered arm where all hand dressings are done. Foot rests can be pulled out in front of these chairs where foot dressings can be done. Between these two chairs is a dressing drum with four compartments holding four different styles of sterile dressings. There is also a small instrument sterilizer and dressing table containing solutions and bandages. Above our wash-up basins we have a small tap from our gasoline supply which is used to remove dirt from injured hands. There is a foot bath for treatment of contusions of the feet and a cabinet for our instruments. Along one side of the room

there is a cabinet 18 inches deep extending from the floor to the ceiling and equipped with sliding doors. This is quite sufficient for all supplies.

In one corner we have a revolving chair and an adjustable lamp for eye cases, a shelf of the cabinet at one side being equipped with all material necessary for this form of accident. A 20th Century eye test box is installed in one corner of the room with equipment 20 feet distant from the moving of the letters.

There is an alcove in one corner about five feet square for the secretary. A filing cabinet for records, a desk with typewriter, a cabinet for sorting the records into their departments and two telephones are within easy reach of the secretary's chair.

4. The laboratory is a room 5 feet x 12 feet, completely equipped for all the laboratory work that is necessary to be done. A water centrifuge, an electric incubator, a microscope, bunsen burners and other paraphernalia are conveniently arranged. In this room we have our drug cabinet and large dressing sterilizer.

5. Medical director's office. This is a room 10 feet x 18 feet and is equipped for making physical examinations of employees. There are two curtained cubicles, 3 feet square, an examining table, scales and a wash basin.

These rooms have a terrazo floor and in the operating room this has rounded corners to facilitate cleaning.

At Weston Works (tractor plant) with 200 employees, the timekeeper is a well-trained first aid man. This plant is just nine miles from Toronto works. It can be easily reached by street car, therefore, our first aid man takes no chances, an accident case, when necessary, being



Operating Room in Massey-Harris Toronto Works. Views show how the room can be adapted to treating various kinds of injuries. It is well lighted at all times, so doctors and nurses work under the best conditions.



sent to the Toronto Works medical department by automobile or street car. The medical director visits this plant each week or oftener if necessary.

At our Brantford works, where there are about 1,000 employees, we have had a nurse on duty for about two and a half years. There is a well equipped operating room which, until the recent reorganization, was sufficient. With the recent addition to our staff of a part-time medical officer and stenographer, we have acquired more room.

In one corner of the operating room a bed for emergency cases is screened off, the stenographer with her records is established in another corner. The medical officer, who puts in two hours a day at this plant, has his desk in another room where he does his consulting and makes his physical examinations.

Our graduate nurse of this plant has so won the confidence of the employees that she has increased the attendance from a dozen a day to six times that number.

At the Verity Plow Company, Brantford, with 500 employees, there has been a nurse on duty for over one year. The operating room here is also well equipped for all emergencies. At present we have no medical officers in this plant, but there is a doctor quite convenient who is called for emergency cases.

At the Bain Wagon Works, Woodstock, with about 300 employees, there is a medical officer who comes to the plant for one and a half hours three times a week for consultation. The rest of the time he is on call for emergency cases. The fire chief is a well trained first aid man who has remarkable ability in judging whether or not a case is serious enough to be sent to a doctor.

#### Treat Cases Quickly

We give first aid and follow-up treatment to all accidents and we call even a scratch an accident. We classify these cases into major and minor, calling

major all cases that the doctor should see or those that lose any time whatever. The accident cases are the only ones which the doctor goes outside the plant to see, these patients being attended to at their homes or in the hospitals if necessary.

Some of the simplest accidents that have happened in our works have turned out to be the most serious because of blood-poisoning. This condition can be prevented by prompt and efficient treatment of each and every wound that is deep enough to show blood. Therefore, we urge every employee to come for a dressing immediately upon receiving an injury. Last month no case treated within an hour of the accident became infected, but we had ten who came to us for treatment after the infection was present. The smallest scratch may mean death. Why play with such dangerous toys?

#### Keeping Men on the Job.

We are equipped to do the very best surgery. This means that the men lose less time and have less disability when they return to work.

Our medical work consists of keeping the men on the job. We urge all employees to come to the medical department for consultation when they feel sick, such as a sore throat or when they feel a cold coming on, in order that by prompt treatment we may prevent more serious trouble. Our work does not interfere in the slightest degree with the outside doctors. Practically the only cases we treat in a medical line are those that would not go to their family physician for treatment. If the employee needs medical treatment at home we advise him to call his family doctor. If he cannot afford to pay for medical treatment, we make arrangements for him to get the very best care possible in one of the hospitals. We will always see that the employee or his family gets proper medical care. We want to make

our employees feel as free as possible from the worries of family sickness.

#### Examine Applicants for Work

We are now making physical examinations of all applicants for employment. We do this, not because we want to keep the man with a defect from getting a job, but rather that we should place the man with a defect on a job where he will



Corner of Laboratory in Medical Department of the Massey-Harris Co. at Toronto works.

not be injured by the work he has to do. We also make these examinations in order to keep out of the plant contagious disease. We make the examination in such a manner that no man can object to it. He steps into his cubicle in the doctor's office, strips to the waist and removes his shoes and stockings and is then inspected and examined from head to foot. He is told of any defect that he may have and advised how to take care of it. During the examination he is also instructed regarding "safety first." Applicants are categorized in one of five categories, according to their physical fitness. Employees with curable defects are instructed as to ways and means of having their condition cured, and close tab is kept on them until they get fixed up.

The sanitation, ventilation and lighting of the factories and offices are constantly under inspection and are gradually being improved.

#### Bettering the System

We are constantly on the look out for ways and means of increasing the safety of the employee. When an accident occurs, a form is sent at once to the foreman for his report. He must describe how the accident happened, how long the man has been working on the job, and who instructed him in his work, and is also asked who is to blame for the accident. He is also requested to make suggestions as to how such accidents may be prevented in the future. This brings to the foreman his responsibility for all accidents in his department. We feel that if a foreman is imbued with the idea of safety that he will make his shop safe. From one of our shops there came many eye injuries, and it was soon noticed that the foreman was frequently appearing with a foreign body in his eye. We insisted that he wear goggles and, as a result, the eye injuries in this shop have been reduced at least 90 per cent.



DR. HERBERT BAKER, B.A., M.B., F.A.C.S.,

Director of Massey-Harris Medical Department. Photo taken in the Consulting Room at the Toronto works.

### A Busy Day's Work

Our service nurse at Toronto works in on the road in her car from 8.00 a.m. till 5.00 p.m. She makes from 12 to 15 calls a day. Foremen are instructed that all employees off work three days must be reported to the medical department with the reason of absence given, if possible. Cases of sickness are called on by the nurse and letters of appreciation of this work are constantly being received. We feel that this is one of the best parts of our work.

We keep accurate record of all patients that come into the department and of everything we do for the employee. At the end of the month this is chalked up against the department from which the patient comes and, in this way, we can keep tab on the accidents and sickness by departments.

It is the policy of this company to make a man satisfied with his job, and it is for that reason this department has been formed. We are trying to make the conditions under which our men work as sanitary and pleasant as can be. We want our employees to come to work free from worry and it is the duty of this department to remove these worries as much as possible.

Health is the workman's greatest asset. He cannot work without it and he can do the best work when he is in the best condition. We are here to advise him how to keep fit and we are trying to keep our plant free from conditions that would injure his health. We want every employee to know this and to feel perfectly free to come to us at any time



NURSE HILL

Starting out on one of her daily visits to the homes of sick employees. This is a service that is greatly appreciated, and forms a strong tie between the homes and the company.

for this advice for himself and his family.

Appended are some figures from the March report that will give an idea of the amount of work done by the medical department:

### MASSEY-HARRIS COMPANY, LIMITED.

#### Report of Medical Department for the Month of March, 1921.

|   | [Toronto. | Weston. | Brant'd. | Verity. | Bain. |
|---|-----------|---------|----------|---------|-------|
| Total attendance in medical department. | 1409      | 44      | 863      | 444     | 41    |
| Service visits of nurse and doctor..... | 201       | —       | 3        | 2       | —     |
| Number of accidents—Minor.....          | 296       | 28      | 270      | 128     | 31    |
| Major.....                              | 25        | 3       | 9        | 14      | 4     |
| Percentage accidents to 100 worked days | .87       | .91     | 1.51     | 1.08    | .53   |
| Compensation Cases .....                | 10        | 2       | 12       | 14      | 4     |
| No lost time .....                      | —         | 2       | 2        | —       | 1     |
| Lost time .....                         | 10        | —       | 10       | 14      | 3     |
| Percentage comp. cases per 100 employ'd | .66       | 1.5     | 1.24     | 2.8     | 1.6   |
| Days lost all compensation cases .....  | 169       | 5       | 131      | 145     | 52    |
| Percentage of worked days lost .....    | .46       | .15     | .70      | 1.1     | .79   |

## Season Cracking of Brass And Other Copper Alloys

IN SPEAKING before the institute of metals, H. Moore, O.B.E., B. Sc., S. Beckinsdale, B. Sc., and Clarice F. Mallison, M.B.E., B. Sc., have the following to say regarding the season cracking of brass and copper alloys.

Numerous specimens of brass in which season-cracking has occurred have been examined and an investigation made of the causes of season-cracking, the detection of liability to fail in this way, the mechanism of the process by which the cracks form and develop, the effects of variation in composition, structure and physical properties such as hardness, and

the prevention of season-cracking. Among the more important conclusions are the following:—

Season-cracking occurs in a great variety of industrial brasses, differing widely in composition, degree of purity, microstructure, and physical properties, but occurs only in material which is maintained in a stress, either by external constraint or more commonly by internal stress. Corrosion of the surface and sometimes of the walls of the cracks is frequently associated with season-cracking, but corrosion effects are not always visible. Season-cracking may occur in brass

coated with continuous protective layers such as lacquer, though nickel-plating is probably completely effective in preventing season-cracking, if a sufficient and continuous coat of nickel is secured.

Highly stressed articles, capable of developing season-cracking in certain conditions, may be kept for years in reasonably pure atmospheres without showing any sign of cracking, and there appears to be no reason to anticipate the development of cracks so long as the condition of the surrounding atmosphere does not change. Some agency additional to the presence of initial stress appears to be necessary for the development of season-cracks. Surface defects do not appear to contribute to the development of season-cracks in brass to any important extent, and corrosion does not necessarily favor their development. Mercury, ammonia and ammonium salts readily produce cracks in brass which is sufficiently stressed in tension. It is probable that traces of ammonia in the atmosphere are an important agency in inducing season-cracking of stressed brass.

Season-cracks almost invariably follow an inter-crystalline path and the cracks produced in stressed brass by mercury or by ammonia are of the same inter-crystalline type. Ammonia appears to have a specific and selective action upon the intercrystalline material of brass, weakening it sufficiently to cause cracking if in tension. Mercury has a similar intercrystalline weakening action.

The greater the degree of hardening by cold work the less is the brass affected by the intercrystalline weakening action of ammonia or mercury, although it is probable that weakening may occur whatever the degree of hardness of the brass.

It is probable that the behaviour of a copper alloy submitted to the combined effect of tension and of ammonia or mercury is a reliable index of its liability to fail by season-cracking. This liability appears to diminish as the zinc content of the brass is reduced. Copper and zinc-copper alloys containing less than about 10 per cent. of zinc are unlikely to fail by the development of season-cracks in service.

A suitably controlled low-temperature annealing which will remove stress sufficiently to ensure freedom from season-cracking with little or no effect on the hardness appears to be the most effective safeguard against failure by season-cracking and might well be applied to all brass articles made by cold-work operations capable of inducing permanent internal stress.

The undoubtedly intercrystalline character of season-cracks in brass appears to be fully explained by the selective weakening action of a chemical substance on the intercrystalline material. The authors are unable to find in the results of their work any evidence indicating that season-cracking is the result of viscous flow of the intercrystalline cement.



# Rise and Fall in the Price of Machine Tools

The Peak in Prices Came About August of the Year 1918—  
Many Machines Are Worth More Than Formerly Owing to  
Improved Design Following the Experiences of the War

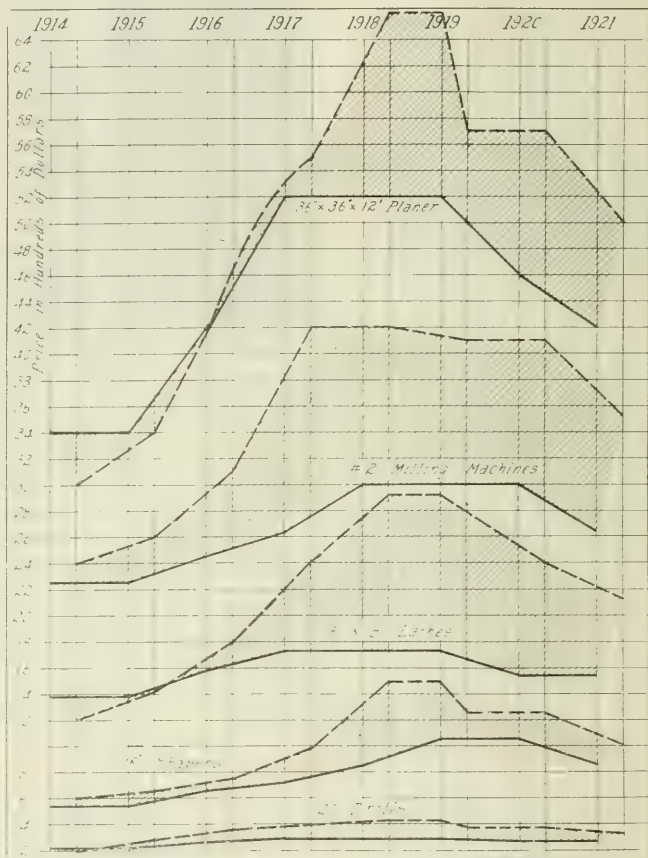
BY J. H. RODGERS

SOME appreciation of the effects of the war and the subsequent conditions arising therefrom may be gathered from the accompanying chart, which illustrates the rise and fall in the prices of a few of the principal types of machine tools over a period of seven years. The graph was developed from the records of two leading dealers in this class of equipment.

The full line represents the actual price (f.o.b. Montreal) on the particular size and type of tool designated by one dealer, while the broken line shows the rise and fall of corresponding tools on the percentage basis, the price in 1914 being taken as 100; the latter being based on the records of the second dealer. It will be seen that there is considerable range in the price of similar tools by these two individual dealers, and it may be gathered that a fair average price for said tools would lie somewhere within the shaded portion of any section.

In explanation it might be stated that the full line which has been developed from prices given for a particular make of machine of a specified size or type, will represent, very accurately, the fluctuations on that tool, while the broken line is a graphical illustration of the price movement of the different machine tools in general. It will be noted that in nearly every case the peak of prices existed in 1918, and it was about August and September of that year that the highest figures were recorded.

The present tendency is towards lower



THIS CHART SHOWS YEAR BY YEAR THE CHANGE IN PRICES.

Price Range in Per Cent. on Machine Tools from 1914 to 1921

|                  | 1914 | 1915    | 1916    | 1917    | 1918    | 1919    | 1920       | 1921      |
|------------------|------|---------|---------|---------|---------|---------|------------|-----------|
| Planers          | 100  | 114     | 140-160 | 180-190 | 200-230 | 170-200 | About Same | 10% less  |
| Shapers          | 100  | 110     | 125-165 | 165-220 | 200-230 | 215-255 | About Same | 15 to 20% |
| Lathes           | 100  | 110-135 | 145-165 | 185-220 | 220-230 | 200-210 | About Same | 10 to 15% |
| Upright Drills   | 100  | 120     | 180-200 | 200-210 | 190-210 | 190-210 | About Same | 10 to 15% |
| Milling Machines | 100  | 105-130 | 130-135 | 170-195 | 190-195 | 160-190 | About Same | 10 to 15% |

Price Range on Machine Tools from 1914 to 1921:

|                         | 1914    | 1915    | 1916    | 1917    | 1918    | 1919    | 1920    | 1921    |
|-------------------------|---------|---------|---------|---------|---------|---------|---------|---------|
| Planers, 36"x36"x12'    | \$3,400 | \$3,400 | \$4,210 | \$5,187 | \$5,187 | \$5,187 | \$4,611 | \$4,210 |
| Shapers, 16"            | 550     | 550     | 650     | 725     | 850     | 1,050   | 1,050   | 850     |
| Lathes, 18"x8"          | 1,385   | 1,385   | 1,575   | 1,725   | 1,725   | 1,725   | 1,540   | 1,540   |
| Drills, 20"             | 215     | 215     | 265     | 285     | 285     | 285     | 265     | 265     |
| Milling Machines, No. 2 | 2,250   | 2,250   | 2,450   | 2,625   | 3,000   | 3,000   | 3,000   | 2,625   |

quotations on nearly all lines of standard equipment, but many factors combine in preventing a too rapid decline to what many might consider normal prices. Probably the one outstanding feature in this connection is the prevailing high cost of production, a condition that not only restricts the manufacture of machine tools, but detracts from the activity in many lines of industry that would, under normal conditions, be large consumers of metal working machinery. In this respect, however, it must not be overlooked, that no little percentage of increased cost of standard equipment might well be marked down to the improvements that have been made in design as direct result of the experience and knowledge gained by tool designers during the years of the war.

# The Trend Toward Automatic Production

Development of Machine Tools—Does Such a Thing as a Completely Automatic Machine Exist?—Operators Have Been Relieved of a Large Part of Their Physical Burden

\*By A. L. De LEEUW, Consulting Mechanical Engineer

IT is but slight exaggeration to say that, next to the pre-war cost of living, no phase of the past is regretted so much as the gradual disappearance of the "all-around mechanic." Those who are optimistically inclined by nature merely say that they are mighty hard to get nowadays, and the pessimists believe that the species will be extinct in a few years and that the new generation will view the skeletons of the dodo and the all-around mechanic exhibited side by side in the same glass case. Hearing some of the talk and reading some of the articles written about the "decline and fall" of the all-around mechanic, one would come to the conclusion that the present high development of our mechanical equipment and processes is entirely due to his efforts, and that all we have accomplished along these lines will disappear with him. And yet it is highly probable that the same man who so earnestly bewails the scarcity of all-around mechanics would be embarrassed to know what to do with a dozen if they should apply for a job.

The fact of the case is there are so few of them wanted, and so few are wanted because only a few are needed. This does not mean that there may be a temporary shortage here and there at some time or other, but that, if we could restore the conditions of thirty years ago, we would have a lot of men who would not fit in with our present-day methods and, on the other hand, there would be a great dearth of machine operators and specialists who could turn out a fair day's output. Our manufacturing systems, methods and machinery have changed, are still changing, and like everything that isn't hopelessly dead, will continue to change forever and ever.

## Hand Versus Automatic Action

The entire development of the machine tool has been in the direction of replacing skill of hand by the automatic action of a machine, and the worker has changed with it. It is true that the mechanic made the machine tool, but, in its turn, the machine tool made the mechanic. To a certain extent, the old-time mechanic is still required for the building and development of new equipment, new tools and new methods; but he has lost his importance as a factor in production. It is sometimes claimed that our present-day mechanic is not so good a man as his predecessor of thirty years ago; but, personally, I am of opin-

ion that the reverse is true. The man of to-day is confronted with more complicated problems than were met thirty years ago, and he solves them.

When machine tools were few and of simple construction, arranged to work at slow speed and with fine feeds, and when shop methods did not call for that high degree of accuracy which is required for interchangeable manufacture, it was not a difficult matter for a man to learn to operate all the machine tools of that time. At the present, there are so many more machines, and they are

Our manufacturing systems, methods and machinery have changed, are still changing, and, like everything that isn't hopelessly dead, will continue to change for ever and ever.

It is sometimes claimed that our present-day mechanic is not so good a man as his predecessor of thirty years ago; but, personally, I am of the opinion that the reverse is true. The man of to-day is confronted with more complicated problems than were met thirty years ago, and he solves them.

so much more complicated, and require so much more knowledge, that it is not fair to expect that any one man should know about them, and much less should be able to handle them all.

It was said that the development of the machine tool consisted in adding automatic features. At one time a lathe was called an automatic lathe because it had automatic feed. Even now, we can find people who speak of an automatic milling machine, meaning merely a milling machine with automatic feed in more than one direction. Gradually more and more automatic features were added, but even to-day one cannot say that a completely automatic machine exists. In fact, such a thing would not be humanly possible. The machine must always receive some attention from an operator. Tools must be watched, adjusted or replaced; material must be renewed, and the machine itself must be watched and, if necessary, adjusted or repaired. We do not expect to be

able to avoid the necessity of doing these things. We cannot hope to build a machine which will repair itself or go to the warehouse and fetch new stock for itself. On the other hand, we have done things in the last thirty years which seemed, at the beginning of that period, very far removed from realization.

Many automatic machines did exist thirty years ago, but not in the standard lines of machine tools. A Jacquard loom is a highly developed automatic machine, and so is a self-binder. Many more instances could be given of automatic machines which existed then. There were also in existence many highly developed and very ingenious automatic machine tools, but they were mostly special machines, developed by some concern which made pieces in sufficiently large quantities to make a specially developed machine economical. Outside of such cases, however, there were only two automatic machines: the screw machine and the gear cutter. In addition, practically all machine tools had some automatic feature, such as feeds.

## List Is Growing

Since that time, we have added to our list of automatic machine tools as well as to the list of automatic features contained in such machines. We now have automatic screw machines for bar work, chucking machines, chasing machines, gear cutters, hobbors, milling machines, screw slotters, nut tappers, etc. In addition, there are a number of automatic machines used for more or less special purposes, like the Multi-Automatic; and many machines developed by large concerns for the requirements of their business. Among these latter machines may be found instances of the highest development which the automatic machine has reached at the present time.

The automatic screw machine, as existing thirty years ago, was a single spindle machine built along the lines of the old-time turret lathe, with the same kind of turret, the same kind of cross-slides; in fact, differing from the existing turret lathe only by the fact that cam-drums were used to give the various motions to the turret and the cross-slides, and that the spindle was provided with an automatic device for advancing the stock and chucking it at the proper time. Nowadays we still have this general type of automatic screw machine, but every single part has been modified so as to make it more adaptable to an automatic machine. It has developed into our present-day machine by dif-

\*From "Industrial Management."



fermentation and specialization. Mechanical movements have been developed which make quick chucking, quick return and quick turret indexing possible. But, in addition, other screw machines have been developed of which the main features differ radically from the old type. Some have been developed for the particular purpose of making small pieces and rapidly, others for making larger pieces, much larger than was ever contemplated when the first automatic screw machines were built, and still others have been developed for large production by the introduction of the principle of the multiple spindle construction. This latter development is almost equivalent to the development of a new type, for methods had to be devised and difficulties had to be overcome which were entirely foreign to the original machine. Some machines have been designed for large production where rapidity of production is the prime requirement, but where the machine requires considerable time for resetting, other machines have been developed for smaller quantities and the setting time has been reduced to a minimum, perhaps at the expense of rapid production of the individual piece. It would seem that in the immediate future we may expect further development along these lines. It would seem probable that the single spindle screw machine will be further developed along the lines of ease in setting up, while the multiple spindle screw machine, which of necessity can only be used profitably for large production, will be still further developed as to rapidity of operation, even if the time and setting would have to be increased.

#### Importance of Secondary Operation

An entirely different line of development of the screw machine is found in the attachments which have been gradually added. In a great many cases, a piece is not entirely finished when it comes off the screw machine. If it takes 20 seconds to make a piece on the screw machine, and then it takes 20 seconds for a secondary operation, there is very little advantage in reducing the original time by 1 or 2 seconds. But if it is possible to do the secondary operation on the same machine while the first operation is going on, a gain of 50 per cent. is made in the total machine time; and not only that, but all the labor of re-handling, re-inspecting, storing, and the difficulty of control, are all overcome at one time. Take, for example, a screw of which the head must be slotted. Let us imagine that it requires 20 seconds to make this screw, and that an operator handles five machines at one time. Then the cost per piece is the same as if the operator spent four seconds per piece, and four seconds will be the measure of the labor cost. After the piece is made, it must be sorted out from the chips and inspected before it can be given to the next operator for slotting the head. If this slotting can

be done also in four seconds, the cost of secondary operations will easily be twice as much as the cost of making the screw. A slotting attachment on the screw machine will do the slotting while the other operations are under way, so that the entire labor cost of the piece will be four seconds. In addition, the slotting attachment deposits the screw in a little receptacle away from the chips, so that it is possible for the operator at any time to gauge his work, and if he finds that some readjustment is necessary, he will not have to throw away more than a fraction of the screws contained in this

Watch the secondary operation. If you can possibly do this operation on the same machine while the first operation is going on, a gain of 50 per cent. in the total machine time is made. Not only that, but all the labor of re-handling, re-inspecting, storing, and the difficulty of control are overcome at the one time.

small receptacle. It may be expected that in the near future attachments or arrangements of machines will be made so that the piece will be entirely complete (up to the point of hardening, if hardening is required) when it drops off the screw machine.

#### Two Distinct Lines

Automatic chucking machines have, so far, developed along two distinct lines: the one is the development of the hand chucking machine, and does practically nothing except operations which can be done on a lathe; the other is a machine which might be considered as a peculiar development of the drill press; it does such operations as hollow milling, drilling, reaming, facing (such as would ordinarily be done on a drill press), threading and tapping. These machines are made either one or two end. Whereas the other type of chucking machine is mostly for round work, this type takes care of work of any shape which can be reached by the tool spindles. This class of machine is essentially a multiple spindle machine. The first type is best illustrated by the Potter and Johnson machine or the Multi-Au-Matic though the screw machine has also been used as a basis for this type. The most important recent development in this class of machines is along the lines of magazines or hopper feeds. Incidentally, these two terms are often confused. A magazine is a device in which the pieces are deposited in a certain way and which then delivers them to the spindle at the proper time and in the proper manner. A hopper feed does not require the pieces to be laid in any

particular manner, but takes them from a hopper and places them automatically in the proper position to be delivered to the spindle. A great variety of magazine and hopper feeds have been developed, and many other arrangements may be expected in the near future, for the tendency nowadays is to do away to the fullest possible extent with all hand operations. Whereas the Potter and Johnson machines, or any of the screw machines arranged for chucking, are single spindle machines, the Multi-Au-Matic is a multiple spindle machine. The same two lines of development which may be expected in the screw machines may also be expected in the chucking machines.

An entirely different line of automatics is found in the automatic finishing machines. Such machines are arranged for secondary operations only. The existing types are best illustrated by the automatic chasing lathe and the Fay lathe, not because they are more representative of their types, but because they are more generally known. As a matter of fact, there are numerous machines of this type in existence, some for turning, some for grinding, some for threading or tapping only, and some for various combinations of these operations. This type of machine is still in its infancy, so far as standard machines are concerned; it has been very highly developed by individual concerns for their special work. Here, also, we may expect a future development of magazine or hopper feeds.

#### If Work Is of Short Duration

Wherever the machine operation is of relatively short duration, we may expect such development of the magazine or hopper feed, because a large percentage of the total time can be saved in this manner; but where the machine time is very large as compared to the time required for placing a piece in the machine, magazine or hopper feed cannot accomplish much saving of time and will probably never be employed. Machines of this type are the gear cutter and hobs. In a great majority of cases, the work done by a gear cutter or hobber requires a great deal of time per piece; but there are cases where the gear to be cut is so small that the time for chucking is a large percentage of the total time. In such cases we may expect magazine feeds; and, as a matter of fact, such magazine feeds are employed where very small gear or pinions have to be cut, such as for watch works.

One of the best examples to show how the world is striving for automatic machines is found in the automatic nut tapper. Here it would seem exists a difficulty which cannot be overcome. After a number of nuts are tapped, the tap will be full and must be taken out of the machine and the nuts shaken off. At a first glance it would appear that this is a condition which cannot be altered.

The tap may be made as long as possible, but finally it will be full and must be taken out. And yet the mechanic's ingenuity has overcome this seemingly insurmountable difficulty by the simple expedient of using the bent tap.

Power presses are sometimes considered as not belonging to machine tools. Whether this view is right or not, it cannot be denied that they are doing their duty in metal manufacturing shops. They, too, have responded to the necessity of obtaining the greatest possible production with the least amount of manual labor. Many devices have been developed for the purpose of making the press more or less automatic. Dial feeds, roll feeds, magazine feeds are quite common and the so-called eyelet machine is as good an example of an automatic machine as any in existence. In line with this class may be mentioned wire forming machines, nail and wood-screw making machinery, and the like.

There is left one class of machine tools which has not been developed to any extent in the direction of automatic functioning, though there seems to be no essential reason why this should be so. The milling machine, though highly developed as a machine tool, has not been made automatic in the sense that the lathe has been transformed into the automatic screw machine. However, there are two classes of milling machines which have, to a certain extent, automatic features. These are the semi-automatic milling machines and the continuous milling machines. Though provided with features which obviate, to a certain degree, manual operation, they lack those features which we instinctively connect with the idea of an automatic machine tool, and that is the presentation of various tools to the work and the automatic presentation of new work to the tool. Such features may be found in a number of special automatic machines built by various concerns for their own needs, but are not embodied in any of the standard milling machines on the market.

### Quantity the Big Feature

The one outstanding point which limits the usefulness of the automatic machine is quantity. The time required for setting up an automatic machine for a new piece of work must necessarily be relatively large and, furthermore, it is almost unavoidable that some pieces of work should be spoiled during the process of setting up. This lost time of setting up together with the lost work must be weighed against the advantages of the automatic machine. As a rule, too much emphasis is put on this unavoidable loss of time, and a great many operations which are now done on manually operated machines might be done on automatics, if a careful analysis were made of all conditions. This matter was forcibly brought to the writer's attention by the following incident:

### A HINT TO THE MANAGER

Not only has the automatic machine arrived, but it is still arriving in greater and greater numbers. Luckily many managers have wakened up to the fact that the trend of the times requires automatic machinery wherever it can be employed.

Instead of installing an automatic machine when the conditions are such that no one could possibly doubt its economic advantage, the live manager of to-day should reverse the process and take for granted that he must employ an automatic machine unless he can clearly show that it will not pay.

A certain part, intended for a clutch, about six inches in diameter and about eight inches long, was made in quantities of fifteen at a time, and only one lot of fifteen per year. Without analyzing the thing at all, it was taken for granted that the quantity was entirely too small for an automatic machine and even for such type of machine as the Gisholt, so that it was customary to make these parts on the engine lathe. The writer had this job transferred to a Gisholt machine in an experimental way, and it was found that the first piece was finished on this machine (including the time required for setting up) before one piece could be made on the engine lathe. The next lot was transferred to a Cleveland automatic, again in an experimental way, and it was found that the first piece was made on the Cleveland (again including the time required for setting up), before a single piece could be made on the Gisholt. Of course, this would not happen every time, but the incident showed how necessary it is to analyze the job carefully before concluding that it is not fit for an automatic.

Against the losses incident to the automatic machine, we must figure the advantages of it. In a broad way, these advantages are the following:

A relatively unskilled man can do the work, and this man can run a number of machines; a single highly skilled man being required for the setting up and inspecting of a number of groups of such machines.

The machines run continuously, without requiring rest periods, and without reduced energy at various times of the day.

Production is assured at a known rate, so that it is possible to plan with greater assurance than when depending on the results of manual labor.

It is quite natural that the manager should hesitate to instal automatic machinery unless the balance is very strongly in its favor. On the other hand, it is a fact that when the automatics are once installed, many jobs are found to which they are adapted, after the machines have been working for some time. It would seem that there is another type of machine needed to fill

the gap between the highest developments of automatic machines and the purely hand-controlled machines. To a certain extent, some existing machines fill these requirements. The Gisholt machine, the Jones and Lamson, and a great number of hand screw machines have some of the essentials of this intermediary class; but they still require too much skill and manipulation on the part of the operator to class them among, or even close to, the automatics. A type of machine might be developed which does every single operation automatically, but on which every operation must be started by hand, thus avoiding a large portion of the complicated mechanism of the purely automatic machine, and at the same time largely reducing the time for set-up. Machines of this class might be called "programme machines," because they would have to be set up for a number of single operations and the operator would get a programme of the sequence of operations which he must follow.

### Special Automatics

Frequent mention has been made of highly developed automatic machines designed and built by concerns which are manufacturing on a large scale. In such machines, many operations may be combined which can never be combined in the standard machine. Drilling, boring, reaming, tapping, milling, slotting, keywaying, turning, all may be done on one machine. Such machines, as a rule, are of the multiple spindle type, and require the highest degree of workmanship in their construction in order to be successful. They are costly to make, and, as only one—or at the best only a few—are ever built, it is very seldom that there are not a number of "kinks" left. Consequently, such machines require a relatively large amount of repair. The fact that a large number of tools are used in one machine means stopping it every time one of the tools breaks down. Many other disadvantages could be brought up against this type of machine, and are being brought up, particularly by people who are not familiar with their operation. However, notwithstanding all the drawbacks mentioned many machines of this type have been



built, are operating successfully, and are wonderful factors in economy. It is a human tendency to make much of difficulties before they are met. The objection was raised against the early railroad that there might be a cow on the track. We all know what Stephenson said about it. It is true that since the introduction of railroads there have been many cows on the track, but we have not discarded railroads.

All the difficulties and disadvantages mentioned above exist and should be carefully weighed, and when that is done, we can express it in a simple way and say that we estimate the efficiency of the machine to be 90, or 80, or even 50 per cent. This simply means that, if we should not meet any trouble, and the machine should be capable of turning out 8,000 pieces per week, then, under the conditions as we estimate them, our output will be only 90 or 80 or 50 per cent. of 8,000 pieces. And that must be the number of pieces upon which we should base our calculations. Whether provision should be made for the amortization of the investment in two years, or five, or ten, depends very largely on the nature of the machine as well as on the stability of the product. If the machine is of such a nature that it can easily be changed over for the production of some other piece made in that factory, or if the piece has been made for many years and there is no prospect of its being discarded for many more years to come the time for amortization may be estimated as quite long. But if the machine would have to be discarded when the piece is made obsolete or when the probable life of the piece is only a few years, or both, then we must figure on a short useful life of the machine and on saving sufficient in production to pay for that machine in the estimated time. It is always a dan-

gerous thing to build such specialized machinery for a new product, not only because the product may have a short life, but because, even if it may have a long life, it is highly probable that it will be changed in some details before it is completely standardized.

#### Do Automatics Lower Standard of Workmen?

Contrary to the belief that automatic machinery tends to lower the standard of the workman, it is the writer's conviction that the general tendency is to elevate that standard. Not only that, but automatic machinery creates a training school in the shop where it is employed. The man who delivers the stock and cleans out the machine by and becomes the man who makes minor adjustments and learns to measure accurately. If he has the necessary mental capacity it is but a short time before he is a full-fledged operator, and again, if he has a higher mental capacity, he will readily develop into a tool-setter or a foreman.

In conclusion it may be said not only that the automatic machine has arrived, but that it is still arriving in greater and greater numbers, and that only recently many managers have waked up to the fact that the trend of the times requires automatic machinery wherever it can be employed. Instead of installing an automatic machine when the conditions are such that no one could possibly doubt its economic advantage, the live manager of to-day should reverse the process and take for granted that he must employ an automatic machine unless he can clearly show that it will not pay.

#### WHAT IS RADIUM?

The question is often asked, What is radium? To put it briefly, radium is a

metal that is described as having a white metallic lustre. It has been isolated only once or twice, and few persons have seen it. It is ordinarily obtained from its ores in the form of sulphate, chloride or bromide, according to the United States geological survey, department of the interior, and it is in the form of these salts that it is usually sold and used. These are all white or nearly white substances, whose appearance is no more remarkable than that of common salt or baking powder. Tubes containing radium salts glow mostly because they include impurities which the radiations from the radium cause to give light. Radium minerals are very rarely, if ever, luminescent.

#### SPEED IN RIVET CUTTING

What is believed to be the record to date for cutting rivets in the dismembering of steel freight cars was recently established by an operator who cut out 1,038 rivets in two hours and 46 minutes. Of this number 683 were  $\frac{3}{8}$ -inch rivets, 228 were  $\frac{1}{2}$ -inch rivets and 127 were  $\frac{7}{8}$ -inch rivets.

The cutting was done on a standard Erie car under general yard conditions, the operator taking the rivets as they came, working inside, outside and under the car. The car was one that had been retired from active service and that was in the car shop for repair, the rivets and plates being covered with heavy scale and rust, thereby rendering the cutting extremely difficult.

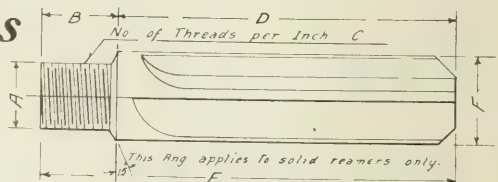
It is said that the record applies not only to the number of rivets cut in the time required, but also to the low consumption of gases used, the job taking only 384 cubic feet of oxygen and 83 cubic feet of acetylene.

## Reamer Proportions

Having a considerable number of holes to ream, here is how one manufacturing plant got over the difficulty. They made solid reamers of the design shown, giving certain proportions to the different sections of the reamer.

These have proved of great productive quality, and the venture has saved them considerable cash since its first being adopted.

By J. H. Moore



| SOLID SCREW SHANK REAMERS   |                 |    |    |                  |                  |                  |   |
|---|-----------------|----|----|------------------|------------------|------------------|---|
| Sizes not less than $\frac{7}{8}$ " and not over $1\frac{3}{8}$ " |                 |    |    |                  |                  |                  |   |
| A   | B               | C  | D  | E                | from F to        | No. Flutes       |   |
| $\frac{5}{8}$ "   | $\frac{3}{4}$ " | 11 | 4" | $4\frac{3}{4}$ " | $\frac{7}{8}$ "  | 1"               | 4 |
| $\frac{3}{4}$ "   | $\frac{7}{8}$ " | 10 | 4" | $4\frac{7}{8}$ " | 1"               | $1\frac{1}{8}$ " | 4 |
| $\frac{7}{8}$ "   | 1               | 12 | 4" | 5"               | $1\frac{1}{8}$ " | $1\frac{3}{8}$ " | 4 |

Canadian Machinery.

# Improve Your Powers of Perception—Try This Contest

Below will be found twelve references to advertisements in this number. To the sender of the first correct set of answers to these we will forward one of these scales.

To win one is not difficult, and at the same time you will add to your store of knowledge. Read the details given below.



The scale is 6 in. long and is made from finest quality steel. One side is marked in 32nds, the other side in 64ths. A table of decimal equivalents is also stamped on one side, and a table of tap drill sizes on the reverse side. This scale is well worth securing.

## What You Have to Do

We publish every week a number of interesting facts or statements selected from the advertising pages for that week. The selections for this issue are given below. Read these through, then turn to the advertising section and see if you can pick out the advertisements to which they refer. The work is interesting, it will train your powers of perception and of memory, it costs you nothing, it will make you better acquainted with the various lines of machinery and tools in the market, and with perseverance you are bound to win one of these useful scales as a prize.

The winner of the May 5th contest, Sam Fishman, 16 Farm St., Point St. Charles, tells us that up to this, his first attempt, he has been too busy to try the contest much as he wanted to. As he happened to be the only contestant with a correct list, it's perhaps just as well for the others that Sam has been so busy.

### CONTEST FOR MAY 26TH ISSUE

Contestants are required to write us, stating to which advertisements we refer in this number.

- 1—What to do if you require unusual precision.
- 2—A piece of good advice.
- 3—A case where it paid a certain firm to change their existing methods.
- 4—Something that is not a pugilist yet can hit hard.
- 5—A case where a postcard, if used correctly, brings important news.
- 6—Something that should interest the small shop owner.
- 7—How to eliminate costly repair bills.
- 8—A case where a product can be furnished to suit any country.
- 9—How to secure civic co-operation.
- 10—Something you can withdraw without injuring the work.
- 11—A product said to allow a much wider scope of work, without loss of efficiency.
- 12—How to secure a practical time saver.

These are Correct Answers for List from May 5th Issue:

- 1—International Business Machines Co.
- 2—Morse Chain Co.
- 3—Canadian Hart Products, Ltd.
- 4—Geo. D. Roper.
- 5—Geometric Tool Co.
- 6—Wallace Barnes Co.
- 7—Landis Machine Co.
- 8—Armstrong-Whitworth of Canada, Ltd.
- 9—Acme Machine Tool Co.
- 10—United Alloy Steel Co.
- 11—Greenfield Tap & Die Corporation.
- 12—Bellevue Industrial Furnace Co.

**Closing Date for This Contest is June 16th**



# Producing a Pump Rod on the Turret Lathe

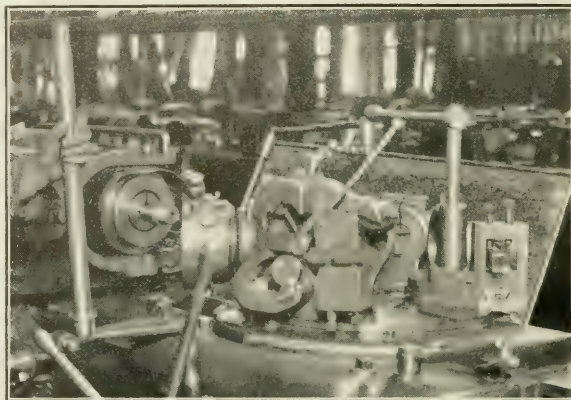
Rod Completed in Two Settings—Material, Cold-rolled Steel Bar Stock—Standard Equipment Used—A Rod is Finished in Eleven Minutes, This Including Both Operations

ON page 76 of the April 7 issue of Canadian Machinery we published an article on the production of a pump rod. At that time we suggested that readers, or makers of machines, let us have their views on the problem, and here is how the Jones & Lamson Co., Springfield, Vt., would proceed to machine the part.

The piece is understood to be made from cold rolled steel bar stock, and we would finish it in two settings, using our regular standard equipment on a 3 x 36-inch Hartness flat turret lathe equipped for bar work. This machine handles bar stock 3 inches in width up to 36 inches in length.

In the first operation the piece is held in our automatic collet chuck. The automatic chuck and roller feed handle rough bars of round, square, octagon, hexagon and flat stock, presenting a new length and gripping it while the machine is running. This chuck is one of the essential features of the Hartness flat turret lathe in its equipment for turning work from full lengths of bars, as its strong and unyielding grip gives a rigid presentation of the work which is of paramount importance. The jaws are of unbreakable form and may be readily made for any size or shape of material within the spindle's capacity.

At the first position, break down the corners of the stock with a chamfering tool fitted with a bell-mouthed bushing, the taper of the bushing being the same as the taper on the chamfer of the work. This is preparatory to turning in the second position. Here the 1½-inch diameter is turned, using the roller back rest turner, the roller supports of the



GENERAL VIEW OF THE TOOLS USED.

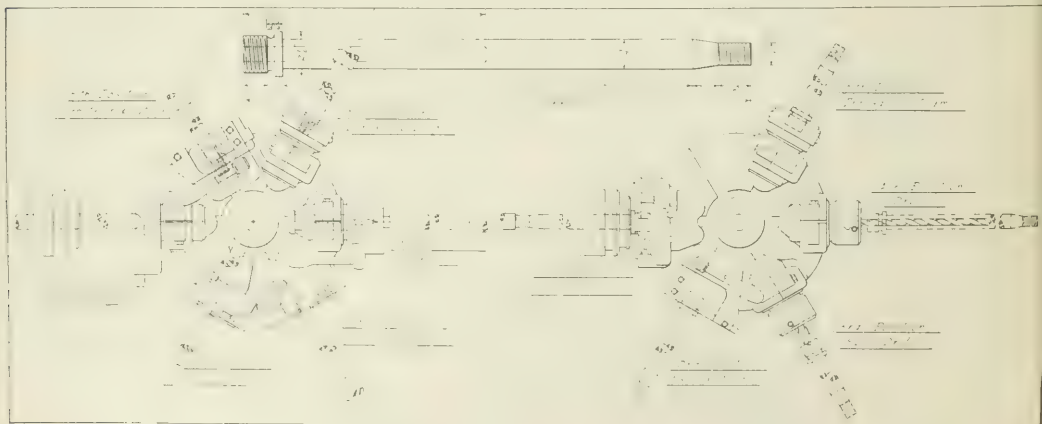
turner following the point of the cutting tool. The rolls on the roller turner run on straight headless pins hardened and ground. These pins are held by a rocker insuring an axis in parallelism with work. All adjustments are conveniently made and are the most direct and unyielding in resistance of working strains.

In the third position, the 1½-inch diameter is turned with a roller back rest turner, the roller back rest in this case being ahead of the point of the cutting tool, and resting on the finished 1½-inch diameter. By this method the 1½-inch diameter is brought concentric with the 1½-inch diameter.

In the fourth position the end is centered, using our roller back rest center-

ing tool. Note that this is a lever operated fixture. It is customary to advance the carriage to a stop, lock it, and then by means of a lever-operated device the piece is centered by hand. We have found from experience that it is much better practice to center, using this fixture, than to center by using the star wheel, for advancing the carriage. Since the lever-operated centering tool is a very sensitive fixture to operate, it reduces the breaking centers to a minimum.

In the fifth position the 1½-inch diameter is fitted with a No. 4 Hartness automatic self-opening die. The automatic fixtures and the combination of the elements that determine the form,



DETAIL OF THE ROD TOGETHER WITH TOOL LAYOUT FOR BOTH OPERATIONS.

lead, diameter and general dependability of the screws produced by this die are well known.

In the sixth position the taper is formed and the piece cut off, using our lever-operated cut-off slide. The sliding tool block is closely fitted and gibbed to the base, which is bolted securely to the turret; a long lever and a small pinion furnish means for feeding the cut-off tool into the work. While forming the taper the work is supported by means of a bushing placed at the rear of the cut-off slide bored to fit the 1½-inch diameter of the work. The production on this operation is 11 pieces per hour.

### Second Operation

In the second operation the piece is reversed and gripped in the automatic collet chuck on the 1½-inch diameter finished in the first operation.

The work is located endwise by a stop in the spindle insuring a uniform dimension in shoulder lengths.

In the first position the 1 11/16-inch diameter is turned, using the roller back rest turner. In the second position face and neck preparatory to threading, using the lever-operated cut-off slide; in the third position spot preparatory to drilling. Any straight shank drill may be used and is held in a little giant drill chuck.

In the fourth position the long hole is drilled, the drill being held in a similar chuck; in the fifth position the 1 11/16-inch diameter is threaded by a No. 6 Hartness automatic self-opening die. The production on this operation is 12 pieces per hour, and the time for one piece finished complete in two operations is 11 minutes.

## CHISEL ARTICLE

Do you know how to make a chisel? If so, do you know how to make a good chisel? These important questions are asked in a recent leaflet issued by the Joseph T. Ryerson & Son, Chicago, and here is what they have to say on the subject:

A very large percentage of the chisels now in use are not good chisels. They are not forged, shaped and hardened in the best way to give long life and adequate service. During the past few years we have secured valuable information from various chisel makers and users and pass it along believing that it will help you to turn out a tool far superior to those ordinarily furnished. Considering the making of a chisel from ¾-inch octagon tool steel, we suggest the following method:

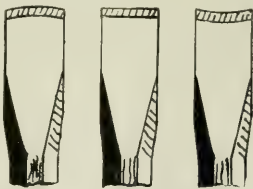
### Forging

Cut off a length of steel, depending on the length of chisel desired, and heat up the end for 2 inches to a bright cherry red. Trim off two opposite sides so as to form a very blunt nosed tool. The object of this trimming is to do, away

with the danger of lapping when drawing out.

The horn of the anvil should be used in drawing out, inasmuch as this will have the least possible tendency to widen the piece, and therefore the minimum amount of "edging in" or hammering on the edge will be necessary. The reason a chisel should not be hammered on the edge is that the grain of the steel will thereby be distorted or, as you might say, "crumpled up," and this always has a tendency to weaken any metal. If in the final forging operation the chisel gets a little too wide, it can be very easily trimmed off on the emery wheel during the grinding operation. Draw the chisel out so that it will be about ⅓ inch thick at the end and about ⅜ inch thick about 1¼ inches back from the end.

The forging should be finished with light blows until the steel has almost lost color, but it absolutely must not be struck after the color has disappeared.



SKETCH 1, 2 AND 3. SHOWING THE DIFFERENT METHODS OF GRINDING CHISELS. NO. 3 IS BY FAR THE BEST FOR ORDINARY WORK.

It is a good thing to reheat the steel to a dull red without using any blast, and give it a second hammering with light blows until the color has again almost disappeared. The four important things to remember in forging a chisel are, therefore: Draw out at a good cherry red heat, finish with light blows at a dull red heat, do not hammer after the color has disappeared, hammer as little as possible on the edge and then only when the steel is fairly hot.

### Grinding

Grind the chisel before you harden it, as you can grind faster in this way without the danger of drawing the temper. The shape of the edge of the chisel is very important, although it is a thing which is often overlooked. Sketch No. 1 shows a chisel ground with a concave edge. If this chisel is driven on to a flat surface, it is obvious that a great strain will be put on the corners, and they are sure to break off. Sketch No. 2 shows a chisel ground with a perfectly flat edge. If this chisel is driven down onto a flat surface and held perfectly straight, the cutting strain will be distributed evenly over the entire edge, and the chisel should be satisfactory. It must be remembered, however, that it is almost impossible to hold a chisel absolutely straight and, therefore, either one cor-

ner or the other will be severely stressed by the chisel being tilted over. Sketch No. 3 shows a chisel ground with a slightly convex edge, which is by far the best for ordinary work. The corners of a chisel are always the danger point, and with the convex edge these corners are protected even when the chisel is tilted over considerably to one side or the other.

### Hardening and Tempering

After the chisel has been ground to the desired shape, heat it to a dull cherry red color for about 2½ inches from the end and quench it vertically in cold water to a depth of 1¼ inches, moving it up and down until no red color is left in any part of the steel. The part which has been drawn out should now be polished with emery cloth and the temper drawn to a dark purple or a blue by holding the chisel over the fire or in a furnace. Always draw a chisel a little more in winter than in summer. We have suggested hardening the chisel back very much further than is usual. The reason is that a chisel so made can be ground a great many times without redressing. Inasmuch as grinding is cheap and redressing is expensive, considerable loss can thereby be avoided.

## SOLDERING SHEET ZINC

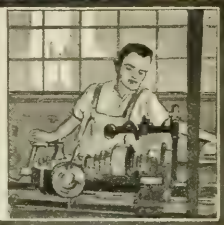
Soldering sheet zinc is an easy task, if you are familiar with the work. However, if you have never handled such material, read these few hints.

Most failures in the attempt to secure joints of the desired strength and quality, where sheet zinc is concerned, are due to overheating the metal. Too long an application of the soldering iron is often responsible for unsatisfactory results. Only a quick pass of the soldering iron over the metal is needed to produce a sound joint. If the contact is prolonged the zinc may melt or its internal structure become so changed by over-heating as to produce a weakening of the metal. Sheet zinc melts at a temperature of 786 degrees F. It is usual to heat the soldering iron until it becomes a dull red, and that is sufficient to perform the soldering of joints of sheet zinc. Solder of half-and-half grade is suitable; but preceding the actual operation, a "cut acid" fluxing solution, or a solution of zinc chloride acidulated with muriatic acid, should be applied to the metal being prepared for the work. Care must be exercised to ensure the sheet zinc being first free from dirt or grease, particularly along the line to be soldered, and the seam surfaces must be in perfect contact.





## WHAT OUR READERS THINK AND DO



### SCREW CUTTING QUERY

By JOHN S. WATTS.

**R**EFERRING to the article under the above title, on page 74 of Canadian Machinery May 5th issue, I would solve the problem of finding the change gears to cut this thread as follows: The lead screw having four threads per inch, would have to travel  $4 \times 9\frac{1}{2} = 39.5$  revolutions to travel the carriage  $9\frac{1}{2}$  in., and the change gears must cause the lead screw to turn 39.5 revolutions while the spindle revolves six times. The ratio of speeds is therefore  $39.5/6$ , and converting into whole numbers by multiplying by two, we get  $79/12$ , that if a 79 tooth gear on the spindle, and a 12 tooth pinion on the lead screw, would give the exact ratio desired.

As we have neither of these gears available, we will try a double reduction, and splitting the ratio  $39.5/6$  into factors, we get

$$\begin{array}{r} 39.5 \quad 5 \times 7.9 \\ \hline 6 \quad 2 \times 3 \\ (5 \times 10) \times (7.9 \times 10) \quad 50 \times 79 \\ \hline (2 \times 10) \times (3 \times 10) \quad 20 \times 30 \end{array}$$

that is, the two driving gears will have 50 and 79 teeth, and the driven gears 20 and 30 teeth respectively. All of these are available except the 79 tooth gear which will have to be made if absolute accuracy is required.

To determine whether the gears available would give a ratio near enough for the purpose, is not so simple. By the regular process of factoring, as given above, the nearest we can come would be to use a gear having 80 teeth, in the place of the 79 tooth gear, which would give us six threads in ten inches, or an error of one-eighth of an inch in the six

threads. As the thread projection is little more than one-eighth thick, this error would be too great.

Although we cannot find a nearer ratio by factoring, we cannot prove that the gears given will not combine to give us a ratio near enough for our purpose. On the other hand, to determine the nearest approximation that we can get by working out all the possible combinations is a formidable piece of work, as fourteen gears used to give two reductions will make precisely 1001 combinations.

Fortunately this is one of the many problems, that can be solved by graphic arithmetic in a much shorter time than by any other method, and is another proof of what I am often contending, that graphic arithmetic is a science that will well repay its study and practice. However, to return to our problem. I find by adopting the method which I will outline later; by using driving gears having 60 and 55 teeth, and driven gears having 20 teeth, we get a ratio of  $6.6$ , and that this combination gives the closest approximation possible with the change gears available. These gears will cut 6 threads in a length of

$$\frac{6.6 \times 6}{4} = 9.9 \text{ inches.}$$

or an error of only .015 inch, which is amply near enough for the purpose.

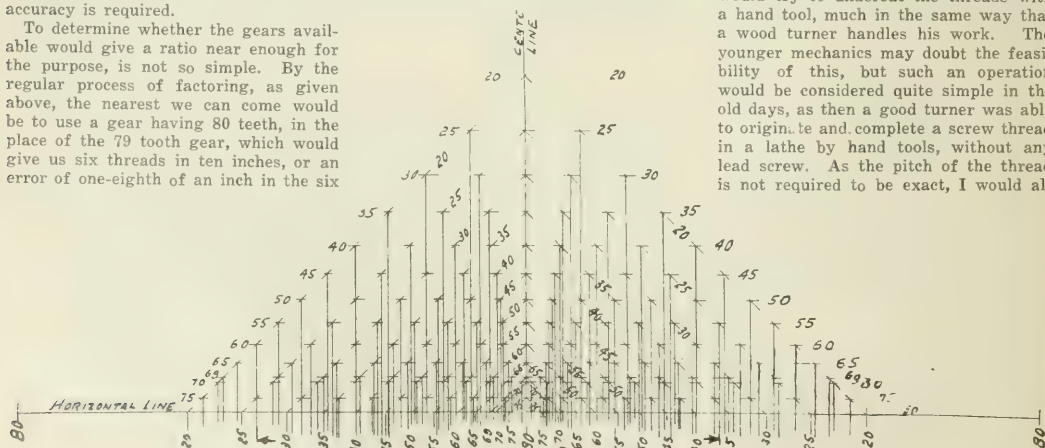
While it will be possible to machine

these rolls by this gearing, the work is difficult to perform, and will take a good mechanic a considerable time to finish one, because of the difficulty of withdrawing the tool at the end of the cut quickly enough, reversing the lathe, and bringing the tool back again to its cutting position. There are only seven threads in the length of the roll, and most of the time will be spent in manipulating the carriage, and reversing the lathe. If there could be a portion of the collars on the ends of the roll cut away to permit the tool to pass through them, the work would be much facilitated, but even then the lathe has to be reversed after only seven revolutions, and it will keep the operator jumping to make any kind of an output.

If there are any quantity of these to make, it would be much more economical to make a metal pattern, and have the thread loose on the pattern, which would of course be split. The mold would then withdraw the body of the pattern from the mold first, leaving the loose threads in the sand, and withdrawing these threads later by revolving them in the sand one half turn. This would permit making the casting with the thread undercut, and eliminate the necessity for awkward machine work.

### Use the Hand Tool

If the castings are already made, I would try to undercut the threads with a hand tool, much in the same way that a wood turner handles his work. The younger mechanics may doubt the feasibility of this, but such an operation would be considered quite simple in the old days, as then a good turner was able to originate and complete a screw thread in a lathe by hand tools, without any lead screw. As the pitch of the thread is not required to be exact, I would al-



THE AUTHOR SUGGESTS THAT YOU USE A CHART AS SHOWN.

most be prepared to guarantee that I know men who could chip the undercut out, and make a good job of it, in less time than by any machining process possible, but, alas, these men are getting very scarce now, and the most simple operations have to be executed by machine, no matter how long it may take.

Returning to the working out of the gears. The set giving the closest approximation was worked out by the use of the figure accompanying this article, and as the construction is simple, and has a wide range of applicability in gear drive problems, it is worth while studying its principle.

The problem to be solved is this. Given a set of gears, having from twenty to eighty teeth, advancing by five, and one of sixty-nine teeth, which combination will give the nearest ratio to 6.583. To solve this it is necessary to know all the possible ratios.

The figure is based on the following proposition:

Let  $a$  and  $b$  = the number of teeth in the driving gears.

Let  $x$  and  $y$  = the number of teeth in the driven gears.

$\frac{a}{x} \times \frac{b}{y}$  = the ratio of the gears.

Therefore  $(\log a - \log x) + (\log b - \log y)$  = logarithm of the ratio.

Starting from the center line lay off on both sides, on the horizontal line, the logarithm of eighty to scale. From the outer ends of this line, mark off points at lengths equal to the logarithms of 25, 30, 35, etc., up to 75, doing this on both sides of the center line.

This is equivalent to taking the logarithm of 80, and graphically subtracting from it the logarithms of the various numbers, 20, 25, etc. It naturally follows that the point 40 for example, on the left hand side, is distant from the center line a distance equal to  $\log 80 - \log 40$ , which in turn will be equal to the  $\log 80/40$  = the log of the ratio of that pair of gears.

Similarly, on the right hand side of the center line, it is obvious that the distance from the center line to, say, point 30 is equal to  $\log 80/30$ , or the logarithm of the ratio of a pair of gears having 80 and 30 teeth. It follows then that the total distance, between these two points, measured horizontally, is equal to the sum of the logarithms of the two ratios, and is therefore the logarithm of the product of these two ratios, hence the logarithm of the ratio of the two pairs of gears combined in a double reduction.

From each of the points so found on the horizontal line, we draw parallel diagonal lines, meeting at the center line, and through their intersections with the center line horizontal lines which are numbered to correspond with their respective diagonal lines, as shown. A diagonal line from point 80, is not shown, as it is not necessary, but it will be apparent that the lengths of all the hori-

zontal lines, if produced out to this diagonal, would be equal to the logarithms of their respective numbers.

Just as the points on the lowest line represent the ratios (by their logarithms) of each pinion to an 80 tooth gear, so will the corresponding points, on the other lines, represent the ratios of the same pinions, to the other gears, having 75, 70, 65, etc., number of teeth.

The intersection of any diagonal line, and any horizontal line, must be distant from the center line a space measured horizontally equal to the logarithm of the ratio of two gears having a number of teeth, corresponding to the numbers on these lines. If we now drop vertical lines from each such intersection, we have graphically the logarithms of all the possible ratios, given by the distances from each vertical line on one side of the center line to each vertical line on the other side.

Taking a pair of dividers, set to the length corresponding to the logarithm of the desired ratio, namely, the logarithm of 6.583, we pick out the pair of lines whose distance apart comes nearest to being that distance, which are the pair marked by arrow heads in the figure.

Following these vertical lines up to their intersections, we find on the left that we have the choice of either 75 and 25 teeth, or 60 and 20 teeth, and on the right, we get 55 and 25 teeth. As we have only one gear of each size, we take the 60 and 20 for one pair, and the 55 and 25 for the other pair.

### SPRING COLLAR HOLDS GEAR IN PLACE

By F. H. M.

For holding a gear in place on a long shaft where it was necessary to remove the gear quite often a spring collar such as is shown by the accompanying illustration was used to good advantage.

This gear is a slip fit on the shaft and a square key drives the same. The shaft

has a groove cut around or in it and the collar shown is slipped into this groove, the collar bears against the gear hub, thus retaining the gear in position on the shaft.

In making this collar it is bent slightly in the manner indicated and hardened and tempered in that position, thus it has a little spring to it which causes a slight tension on the gear and prevents rattle.

### SCREW CUTTING QUERY

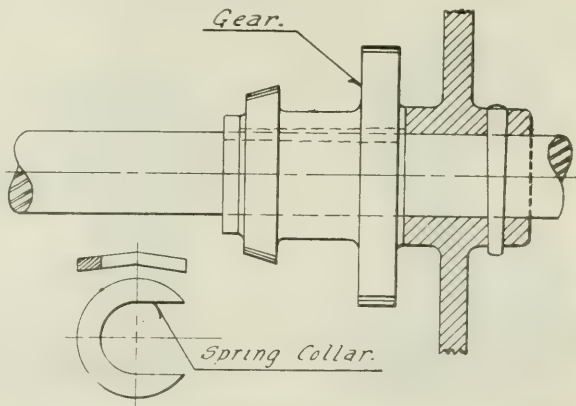
By H. R. J.

The question on screw cutting, which appeared on page 74 of the May 5 issue, is somewhat out of the ordinary but may be solved by the same method used for common threads—to a close degree of accuracy. It was shown that the pitch was 1.6458 inches, so that with a four-thread lead screw the ratio would be as .25 to 1.6458. It will readily be seen that the lead screw must revolve much faster than the work, so that the driving gears will require to have the greater number of teeth. It is also obvious that a tooth more or less in a large gear will make less difference in pitch cut than a tooth more or less in a small gear. For the problem in question (a four-thread lead screw and gears as stated) a suitable compound train would be 75 into 30 and 92 into 35—the 92 being the new gear required, the two large gears being the drivers.

To prove the accuracy of the train, divide the product of the driving gears and the lead screw by the product of the driven wheels. Thus:

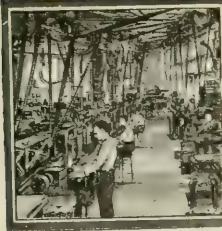
$$\frac{75 \times 92 \times .25}{30 \times 35} = 1.6428 \text{ inches.}$$

This is an error of 1.6458 minus 1.6428 equals 0.003 inch per pitch of screw, but only 0.018 in six complete revolutions. As absolute accuracy does not seem to be required, this discrepancy could be taken up by manipulating the compound rest.

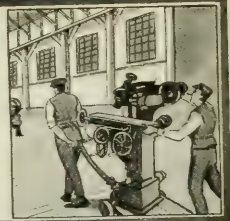


METHOD OF HOLDING GEAR ON SHAFT WITH SPRING COLLAR.





## DEVELOPMENTS IN SHOP EQUIPMENT



### QUICK CHANGE LATHE

The Rockford Lathe & Drill Co., Rockford, Ill., have placed on the market a 14-inch swing, motor driven, geared head, quick change lathe as shown in the accompanying illustrations. This machine is intended to meet the demand for a small heavy duty lathe of sufficient weight and power to handle rapid production.

The bed is of deep cross section and is well braced. The headstock is driven by a single pulley running at 400 r.p.m. Twelve spindle speeds are provided in geometrical progression with the use of only 13 gears. These are of large diameter, wide face and coarse pitch, are cut from solid steel and run in continuous oil bath. Spindle and all shafts are of high carbon steel, accurately ground to size. Spindle has 1 5/16-inch hole through its entire length and is provided with special thrust bearings of alternate collars of hardened steel and bronze. All bearings are of high grade bronze and are equipped with large, sight feed oilers.

The tailstock is of the off set type, allowing compound to set parallel to bed and is provided with set-over for turning tapers. Tail spindle is locked by a new and improved clamp which does not require the barrel to be split.

The carriage is especially heavy, with extra wide bridge, and has a bearing on the ways of 20 1/4 inches, being provided with self oiling felt wipers. A thread cutting indicator enables operator to

catch any pitch of thread without reversing lathe.

The quick change gear box is of new design, a simple and powerful unit having 32 changes of threads and feeds obtained through sliding steel gears and hardened steel clutches, controlled by two large convenient handles in connection with tumbler. Direct reading index plate mounted on front of box gives standard threads from 4 to 56 and feeds 18 to 252 per inch without the removal of any gears, but special pitches may be cut by substituting extra gears on the quadrant, giving an almost unlimited range. All gears are of wide face and coarse pitch and are cut from solid steel. Lead screw and feed shaft operate independently, either being engaged by knob in front of box.

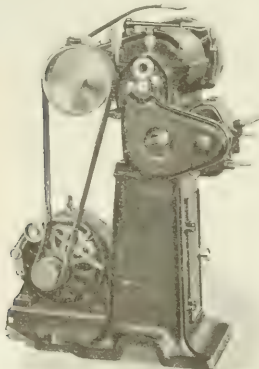
The motor may be of any standard make, using either direct or alternating current, preferably of 1 1/2 or 2 h.p., with constant speed having a maximum of 1,200 r.p.m. Motor is mounted on detachable plate securely fastened to base cast integral with cabinet leg, driving through a long belt 3 inches wide, kept at the proper tension by means of an adjustable idler pulley. This construction eliminates the task of removing motor should occasion arise to lift cover of headstock for inspection or adjustment. Lathe may be furnished with or without motor and is regularly supplied with cabinet leg as shown on cut. In some instances, motor may be placed on the floor, wall or ceiling and belted direct

to headstock pulley, in which case idler pulley may be omitted as the belt tension may then be taken care of by the usual motor base and adjustable rails. When this arrangement is desired the ordinary leg is substituted for cabinet leg.

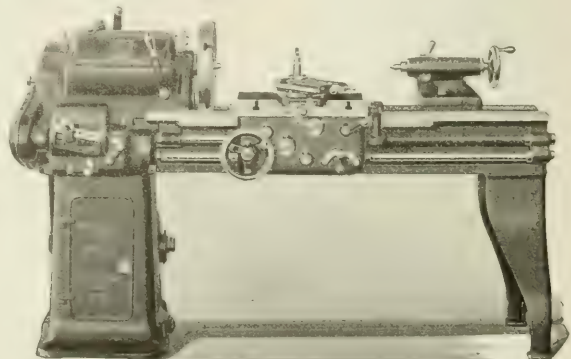
The regular equipment includes steady and follow rests, large and small face plates and wrenches.

### LATHE TOOLS

Several new designs of lathe tools have been placed on the market by M. B. Hill, 10 Eden Street, Worcester, Mass. These include a boring tool, a threading tool, and a lathe test indicator. In the boring tool the bar is held by means of a swinging link that permits of vertical adjustment of the tool bit without altering the alignment. One single screw provides facilities for tightening the bar and the holding link. The design of the threading tool provides for its use either as a spring or a rigid tool. The cutter blades are interchangeable and are adjusted by means of a vertical screw just back of the cutter. The conversion of the tool from a rigid to a spring tool is by means of a tapered bolt passing transversely through the shank. The lathe test indicator is fastened to the shank by a universal joint, thus permitting of ready setting to any angle. The tool is provided with two sensitive points and either of these may be removed without disturbing the other. Facilities are also provided for easy access to the interior for repairs or adjustment.



END VIEW OF MACHINE



GENERAL APPEARANCE OF THE LATHE.

## NEW THINGS IN MACHINE TOOLS

### PUNCH AND RIVETER

The Band Pneumatic Tool Co., Kansas City, Missouri, have designed and developed a new punch and riveter.

Among the advantages claimed for this machine is the fact that although it is a standard unit it weighs but 750 pounds and can be readily moved from place to place in the plant where the work to be done is located. The air cylinder is of the single type and connected to the plunger by means of a heavy lever, the fulcrum point being so located as to give the maximum tonnage on the rivet dies. The frame is of single section, split head type, one piece, of high quality cast steel. The air cylinder piston head and cylinder head is of gray iron. Piston head provided with lever cups held in place by follower rings. The air cylinder head is provided with a stuffing box and nut, properly backed to prevent leakage around piston rod. Bosses are cast integral with outside base surface of air cylinder, providing proper connection through bolt with rear end of yoke, giving the air cylinder a knuckle joint motion. The fulcrum lever is strongly constructed of cast steel. The valve is equipped with foot pedal control, leaving both hands of the operator free to handle the production as it passes through the machine.

The machine has a capacity for punching 13/16-inch hole in a 9/16-inch plate and a riveting capacity of 3/4-inch cold rivets. It is operated on a standard air pressure of 100 pounds and exerts a pressure of 70,000 pounds on the rivet and punch dies. In a recent test this machine with two operators did the work heretofore accomplished by eight men using pneumatic hammers. It is said to be especially adapted for light structural steel work where mass production is desired and rigid fabrication essential.

### SELF-CENTERING CHUCK

A chuck operated by worm gearing in connection with a scroll plate has been developed and placed on the market by H. Spillman, of Zurich, Switzerland. The scroll proper is not an integral part of the plate, as is usual in chucks of this nature. The scroll is so designed that but one tooth of the jaw is engaged at the one time, with the exception of the small overlap given to the scroll. This construction makes it possible to give a shape of the jaw teeth that will add greatly to the bearing surface in contact and also to the efficiency of the chuck. The scroll is very heavy, is let into a groove in the plate and is hardened and ground. The jaws are of steel, hardened and ground.

### ECONOMIC TOOL HOLDERS

That "good tool holders are not an expense, but an investment" is the point emphasized by the Canadian Production Tool Co., Walkerville, in describing the merits of their new line of tool holders. These are made of tool steel, and slotted in such a way that turning bits of any length may be easily adapted to the job. An economic feature of this idea consists in the fact that broken or worn drills or pieces of high speed steel that can in any way be used as a tool may be converted into a valuable bit. A variety of designs have been followed in the holders, rendering them adaptable to any requirement. The straight shank holders are the best for heavy duty work and will stand up under exacting service. This tool has a round socket to permit of bits of any length being used. A right or left hand square turning tool holder is designed to utilize scrap high speed steel of any length. A right and left hand square turning tool holder without cap screw is adapted to work when it is necessary to have the holder and tool close up to the work, permitting heavy cuts at high speed without chatter. An economical holder is the right and left hand round turning, without cap screw. Time can be saved in not having to tighten and loosen the cap screw as the tool post screw will effi-

ciently serve the purpose. A broken or worn drill is just as useful in this holder as a standard bit. The line includes right and left hand cutting off holders with or without cap screw, double and single blade parting tools, straight round turning tool holders, drop head wheel lathe tool holders and straight cutting-off tool holders. It is difficult to imagine a purpose in tooling to which these holders are not adaptable and the outstanding claim for them is that they pay for themselves by converting into actual value material that is very often regarded as waste.

### TWO-SPINDLE THREADING MACHINE

Some interesting features are incorporated in the new two-spindle threading machine recently brought out by the Geometric Tool Co., of New Haven, Conn. External or internal threads may be cut by using taps or dies in the heads, and several combinations of threading are possible by the use of the two heads. The drive for the two spindles is obtained through the one single pulley at the rear of the machine but each spindle may be controlled independently by means of the change gear levers located at either side of the machine. The opening or closing of the dies or taps is controlled by adjustable stops. Accurate setting of the work for length of thread is secured by means of suitable gauges. The machine, if desired, may be fitted with ball-drive reversing tap holders. The machine has a tapping range from 1/8 inch to 3 inches.

### LEADING ARTICLES IN THIS ISSUE

Conditions in the Canadian Centres ..... 68

Trade Has Been Rather Dull in All Centres—West Shows Substantial Industrial Expansion.

Machining Large Gear Blank on Automatic 71

Principle of Design—Various Attachments Used—Tooling For Large Gear Blank—Set Up For Long Shaft—Making Bearings Out of Tubing.

Canadian Machinery Drafting Course ..... 75

Mechanical Drawing Defined—Use of Instruments—T-Square Exercise — Practice Plates — Triangle Problems.

Harder for Man to Get Injured ..... 78

Carelessness is Hard Thing to Eliminate—Prompt Attention to Minor Injuries is Sure to Cut Down the Off Work List.

Various Examples of Turret Lathe Practice 80

Machining a Clutch Gear—Producing a Large Steel Spindle—Special Tools.

Medical Services in Industrial Plants ..... 83

Keep Men on the Job by Doing Away With Needless Time Losses—How the Safety Idea is Being Taught.

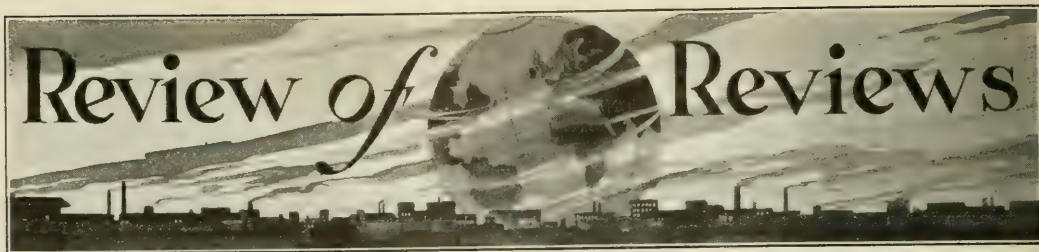
Rise and Fall in Price of Tools ..... 86

Peak in Prices Came in Year 1918—Many Machines Are Worth More Than Formerly—Improved Design.

The Trend Toward Automatic Production .. 87

Development of Machine Tools—Does Such a Thing as a Completely Automatic Machine Exist?—Operators Have Been Relieved of a Large Part of Their Physical Burden.





## Ideas for Stimulating Interest

IT is a well-recognized fact that employees could, if they so desired, save many a dollar for their employers, but how to get them to make their suggestions is another question. In speaking on this subject, "Factory" tells the following story:

"An Eastern manufacturing company failed to get good results from their men through the suggestion boxes. Although they reorganized the committee handling the suggestions, and in every other possible way endeavored to get the men to make suggestions, still they were not successful.

"The prizes offered were cash payments and the company did not hesitate to pay well for good ideas. Yet all was to no avail. Finally the matter became such a drag that it was brought to the attention of the factory manager.

"He started out to make a detailed analysis of the problem and before he had gone very far he learned that the main trouble was due to the fact that the foremen were doing everything possible to get new ideas from skilled men, such as machinists, but were paying no attention to the semi-skilled and unskilled men. The situation had become so acute that the factory manager found most payments had been made to a few men who had been christened, by the balance of the employees, 'Suggestion Hoppers.'

"This opened his eyes and thereafter in each man's pay envelope there was a little slip telling a man how much more he would have had in his envelope if he had made a suggestion.

"For instance, one slip read: 'You lost the price of a new pair of overalls this week. Why? Because you did not turn in a suggestion.'

"After a four weeks' campaign of this nature there was literally a deluge of good suggestions. All this due to the fact that every man in the ranks was thinking, instead of just a few."

\* \* \*

## Industrial Fatigue

THE subject of Industrial Fatigue was the title of a paper delivered recently before the Royal Society of Arts in London, England. It was pointed out by Dr. Myers, the author of the paper, that five different factors are involved in the problem of quantity production; namely, fatigue, practice, incitement, settlement and spurt. In commenting on the paper, "London Engineering" says:

"Dr. Myers showed some curves illustrating the effect of hours on workers, comparing the eight and ten-hour days and stated in his paper that the reduction in hours increases almost invariably the hourly output. Although there are, and have been, undoubted instances where this has occurred, there is, in our opinion, need of much further data before this rule can be laid down. The lessons of the past two years certainly in many directions are in conflict with the contention. Hours have been reduced 20 per cent., but output has fallen by a good deal more, in spite of many efforts to make the conditions of the employee more pleasant while at his work, and to assist him in enjoying his leisure in a healthy way. There must obviously be a limit, and who shall say definitely when we have overstepped it? After a few years of eight hours we will be told probably that output will increase if we reduce the hours to six; a spell of that and then the demand will be for four, which some labor idealists are dreaming of now. From present indications it would appear that the maximum output is to be obtained with something over eight. Even Dr. Myers'

curves were by no means convincing on this point. In fact, when the classes of work were differentiated, it seemed to us in the short time the curves were to be examined on the screen that in some processes the ten-hour day seemed the more productive."

\* \* \*

## Developing Export Business

TO develop a successful export business it is essential that the manufacturer provide adequate facilities in the new field for supplying the immediate needs of the prospective customer. The possibility of several weeks' delay in delivery of goods has frequently resulted in loss of business. The display of merchandise that can be disposed of on the spot is a necessary factor in creating and holding new markets. In a recent issue of "Machinery" appeared a brief statement—in the form of a suggestion—from Col. W. N. Taylor, European sales manager of the E. I. DuPont de Nemours Export Company, of Paris. He says:

"To solve this problem the only method at present is for each individual manufacturer to undertake the maintenance of a storehouse, but in many cases the overhead involved is prohibitive. It would be of interest to members of the American Chamber in France to consider the possibility of a number of houses forming a small company to maintain a warehouse, with a truck or trucks, for deliveries and for handling the stocks of the member companies. This would permit companies carrying a moderate-sized stock, or who are uncertain as to their proper stock volume, to enjoy the facilities of a stockroom, with access to and control of their merchandise in a manner more satisfactory than as at present in public warehouses."

\* \* \*

## Trans-Atlantic Wireless 'Phones

IN a recent issue of the "London Times" appears a statement by Marconi, relative to the demonstration of long distance telephony carried out by Col. Varty in the United States. Mr. Marconi's ideas on this subject were, in part, as follows:

"It is a great achievement as far as ordinary telephony goes; the wireless part is only twenty-nine miles. That is nothing. If it had been 2,900 miles it would interest me. The demonstration is said to prove it is possible to telephone—by wire, of course—from London to India, and perhaps to the Cape. I say that it is quite true, but you would have to overcome the difficulties of maintaining a telephone wire of that length. If the wire were to South Africa it would have to go through France and Spain, across the Straits of Gibraltar and along the whole of Africa to the Cape. I do not think that is practicable in the present state of the world.

"The alternative is the wireless telephony that has been developed, but I do not think it is at present capable of doing these very long distances, although a few words have been gotten through from England to America and from America to France. Since ordinary telephony will not work through long cables, this achievement in America doesn't bring a solution of the problem any nearer, so far as telephony across the ocean is concerned. I expect to bridge the Atlantic with wireless telephony and I think—though one cannot always be certain—that the ocean will be bridged first in a practical manner by wireless telephony, and not by telephony through a cable. The cost of laying a practical telephone cable between Europe and America would be prohibitive."

## Development of Copper Steel

"IT is estimated that the annual wastage due to corrosion of iron and steel products is between 60 and 90 million dollars, this being the bare cost of the materials lost without taking into account other closely allied losses. During recent years the problem has been attacked from many different angles, but in the light of present knowledge, considering the average materials of construction, it is considered that the best results are obtained by alloying from 0.15 to 0.30 per cent. of pure copper with normal Siemens or Bessemer steel. Material of this nature has been on the market since 1911."

So states D. M. Buck in "Blast Furnace and Steel Plant," and the following information on the subject is quoted from various papers published over a number of years. Copper in soft Bessemer steel lessens corrosion. Copper steel resists the action of sulphuric acid. Bessemer and open-hearth steels containing 0.15 to 0.30 per cent. of copper show decided superiority against corrosion under actual service conditions. The corrosion of electrolytic iron is reduced if it is alloyed with various amounts of copper, nickel and manganese. The durability of old steel fencing wire is due to the fact that it contains copper. Steel with as little as 0.03 per cent. of copper corrodes only 60 to 70 per cent. as fast as steel containing 0.01 per cent. The minimum copper content from the point of view of resistance to corrosion is 0.15 per cent., and it is not necessary greatly to exceed this figure. The life of unprotected steel sheets having a copper content of 0.15 to 0.25 per cent. is increased from 300 to 500 per cent., while the increase in cost over plain steel is not more than \$2 to \$3 per ton.

While most iron and steel fittings used in exposed positions are, in most instance, provided with some sort of protective coating, this is generally only of a transitory nature, and as soon as it wears off the bare metal is subject to corrosion. If the metal were copper steel, the extra life would be an asset of incalculable value. It is also claimed that when copper steel is painted the adherence of the paint is much better than on ordinary material, so that this protective coating remains longer in position, and so adds further to the durability of the material as compared with ordinary steelwork. The claims of copper steel are fully substantiated, while the low melting point of copper ensures its rapid diffusion when added to molten steel, and it does not segregate.

\* \* \*

## Keeping the Plant Running

WE hear a lot about hard times, poor business, and hard luck, in the United States, but in a recent article in American Machinist, an eastern manufacturer unloads himself of some splendid optimistic remarks. He states as follows:—

"These are ideal times to push new developments whether in machinery, tool design, method of work, or improvement of shop processes. Such work is of a nature to be day-work rather than piece-work, and to require almost the entire payment in the form of wages rather than material as compared with regular production work. The available resources can be used to carry the organization a longer time, at the same time producing results which will give a big boost to the production business when the demands for that again return.

"Our principal task is to maintain our organization. We plan, instead of laying off a certain percentage of men, to run the whole shop a certain percentage of the time, so that the entire organization may be carried along. Reduction of overhead expense is taken for granted, but this entails close supervision.

"While we are building some complete machines for storage, there are objections in connection with the income and excess profit taxes to this that set a limit to the practice. A given amount of labor and material will show a higher inventory value in finished machines than in any other form. This means a higher book profit at the end of the year, and a higher tax, even though not a machine is sold.

"We have no immediate expectation and do not think it will be necessary to reduce wages. The machinist has been poorly paid as compared with some of the organized industries and we believe that he should not suffer because he is unorganized."

## Two Methods of Saving Nails

NAILS, like matches, are very seldom considered an expensive item. At least, from the amount of nails and matches wasted, one could quite readily come to such a conclusion. A writer in Factory, speaking on the subject of nails, comments as follows:—

"After the steel strike the price of nails went sky high. The superintendent of a Connecticut factory found it difficult to get a supply sufficient for the every-day needs in the factory.

"By a little careful planning he was able to effect quite a saving of nails in the box and case department. All of the wooden boxes and cases are used for shipping purposes. So the number of nails to be used in the different widths of boards was standardized. Heretofore five or six nails were used in a board where four would have been plenty; or four nails when two would have been sufficient.

"The same method of procedure was carried out in the shipping room. They now use only enough nails to nail up the shipping cases properly. The superintendent prevailed upon the shipping clerks to keep within the standards set, and the results are gratifying.

"In the carpenter shop they are also conserving their nail supply by applying common sense to the use of nails. When the carpenters get through with a job anywhere around the factory there are always a lot of nails left scattered about the vicinity of the work.

"Some are perfectly good, others bent or blunt. By using a large magnet they can easily and quickly gather up the loose nails. These are sent to the gate house, where the gate man in his spare time sorts and straightens out the bent ones.

"All in all, they are saving a lot of nails in the factory every day; and, what is equally important they are effecting this saving almost without cost."

\* \* \*

## Directing Power Into Useful Work

IN considering the question of power and its application to the machinery which it is to drive, we are confronted with a rather complex subject. So states H. Campbell in the "Michigan Manufacturers' and Financial Record."

"The last few decades," he continues, "have seen the development of the belt drive, and by far the greater amount of machinery, especially that used in production of small metal parts, is belt-driven. The use of the chain is coming more into favor, also, as a result of recent developments in chain-belt engineering. It is often exceedingly useful for transmission of power within the limits of a single machine, and beyond a doubt will be applied to many new uses in the future.

"The respective advantages and disadvantages of these methods depend upon the conditions, size of the machines to be operated, and the duty that is to be performed. Where the amount of equipment to be driven is not too great, the economy of driving direct from the lineshaft is apparent. But where the volume of equipment is so great as to necessitate the division of the plant into several departments, the problem is solved by the use of electricity. In this case, all the machines which would be most likely to be in operation at one time are grouped together and a motor supplied for the group. And very recently a number of plants have been built in which the individual motor-driven system was adopted, thus eliminating the problem of belts, shafts and countershafts, with all the attendant accessories.

"A recent survey of the methods of power transmission employed by American manufacturers has disclosed the fact that 78 per cent. use belting (or rope) in their plants. Of this number 48 per cent. use leather belting and 24 per cent. use rubber belting. The silent chain has gained favor rapidly in the last few years as a medium for power transmission.

"The pulleys in general use are the wood, iron, paper, and leather, and an iron pulley surface with hard maple wood.

"Bearings are now either the roller or the ball-bearing type, although a few bronze and babbitt bearings are still in use."



## What Business Paper Editors Say of the Outlook

### A Decided Undertone for Improvement

By J. L. WYCKOFF,  
Editor "Canadian Grocer."

WHILE sales are still from ten to fifteen per cent. less than normal, viewing the business situation from the wholesale grocer's angle, there is a decided undertone for improvement. Last year wholesale merchants failed to see the hand writing on the wall and the mad scrambling to stock up that was manifest since 1914 continued until well into the fall of the year. Buying for future was the order of the day, undoubtedly more from force of habit than from lack of judgment and foresight.

When the markets commenced to sag some wholesalers still continued to buy futures. Take the case of prunes, for instance. The opening price on prunes was several cents per pound higher than in 1919, but in spite of this and the fact that other commodities were due for a landslide, heavy purchases were made. Some houses found themselves with as much as two cars of prunes on hand when the market broke. The downward movement on prunes continued until as much as seven cents per pound decline was registered on some sizes and around four cents on others. A car of prunes will average 30,000 pounds, so it is an easy matter to estimate the loss on this one article. But prunes was only one item; rice, canned goods and dozens of other lines were equally hard hit.

One wholesale merchant recently told the writer that during the past year they wrote off \$33,000.00 on their inventory. This firm takes stock twice a year. On the first of November last \$20,000 was deducted from the inventory and on the inventory just completed May first, the slate was further wiped to the extent of another \$13,000. This was not done with the expectation of lower levels, but in order to bring their stock in line with present values.

Other wholesale houses have been doing the same and it is safe to say that the loss will average four per cent. and the loss in Toronto alone will run into half a million dollars. Keen competition, and in many instances selling goods at a less price than replacement costs, has resulted in fairly well cleaning up stocks, and no doubt will be the means of bringing about a more rapidly stabilized basis.

The fact of the matter is that the buying last year was unduly heavy and prices unquestionably too high. Something had to happen, and it did with heavy losses. This year wholesalers are not buying futures and intend to carry out this policy for the balance of the year at least. This will probably result in short packs, but perhaps, commendable, as it will tend to create a more active, sane movement.

\* \* \*

### Farm Business Conditions

By F. M. CHAPMAN,  
Editor "Farmers Magazine."

THE farmer's period of deflation has arrived. Tumbling prices for all his products have left him almost dazed with the giddy decline. All livestock have followed, although not so disastrously, the lead given by sheep and wool. Many feeders this past season have lost heavily in their sales of beef cattle. Some even were unable to repay the bank loans from the sales. Pork is down to a point where profits seem questionable. Following this, comes the fall in the prices of all coarse grains. Wheat has dropped to near the dollar mark. Oats and barley are below pre-war prices.

Poultry and dairy products have also declined to an extent which seemed impossible two months ago. Butter, despite the smaller cold storage returns, of over 500,000 pounds in the U.S. over last year, has been selling for 22 cents at country points, while one cheese board last week reported no sales with a quotation of 14 3-4 cents.

Nevertheless, farm operating expenses have declined nothing like these figures. Wages made at the beginning of the

year are still high. Farm machinery has even advanced so that there is the unmistakable evidence throughout the country for farmers to stop buying beyond immediate necessities. It is noticeable though, where commodities are cut in prices with an evident desire to meet the drop in farm products, that there is a tendency to carry on in their purchases. An instance of this is seen in the paint business. Early price cutting by manufacturers induced many people to go ahead and apply the paint that was long overdue although this was hampered somewhat by the high retail prices on old stock.

Seeding has been done in Canada under fairly favorable conditions and the outlook for crops is so far a good average one. The usual enterprise in feeding cattle is not in evidence as livestock are a debatable question at present. The American tariff and the likelihood of the British embargo remaining on, are not encouraging agriculture for her future marketings. High freight and express rates are having a most depressing effect on agriculture generally, for the returns to the farmer for his produce, after deducting freight and commission charges are so much lower that profits are entirely forgotten in farm business. Naturally then the farmer's buying power must be seriously interfered with.

The farmer is saying very little about it. He has not complained about the drop in prices. He is sitting tight waiting for others to do likewise and if he does not buy, business in Canada will certainly feel the jar. It is felt that a return to normal prices in labor as well as in commodities would encourage greatly the production of wealth, and a greater circulation of money during the coming fall and winter.

\* \* \*

### Stocks Are Getting Much Depleted

By H. L. SOUTHALL,  
Editor "Hardware and Metal."

WHILE wholesale hardware trade has been maintained in good volume during the first months of this year, little booking is being done for future delivery by the retail trade, and some wholesalers fear a continuation of quiet trading during the summer months. On the other hand the retail trade has been ordering goods only as required, and generally frequent orders for small quantities, and if this policy continues the volume of summer trade may show up a good deal better than expected. Wholesalers are liquidating stocks in most seasonable lines in the expectation of lower prices before these will again be required, but on lines which are in demand all year round a normal stock is being maintained.

With retail hardware merchants reporting active business, especially from the farming communities in Eastern Canada, one prominent wholesale merchant is of the opinion that underlying conditions in the retail trade must be better than at this time a year ago, even if there is little evidence of improvement. He is of the opinion that retail stocks must be getting pretty well down to the shelves, and that the law of demand must soon make itself felt. Some wholesalers and manufacturers are of the opinion that a stimulation of export trade would materially help present conditions.

It is significant that hardware trade in manufacturing centres is feeling the pinch more than in the rural districts. Recent legislation affecting firearms and ammunition has curtailed trade in these lines, and some changes in prices on binder twine, etc., may be necessary, due to the increased taxation provided under the new budget.

Generally speaking, manufacturers and importers of hardware expect little change in prices due to the revised tax and tariff regulations, which add approximately 5 per cent. to U. S. goods imported into this country. The effect of the changed basis of value for duty may affect Belgian window

Continued on next page

# CANADIAN MACHINERY

## AND MANUFACTURING NEWS

Published in the Interests of the Machinery, Manufacturing, Iron, Steel, and Metal Working Industries.

Member of the A.B.C. Associated Business Papers and Can. Nat. Newspapers and Periodicals Association

B. G. NEWTON, Manager  
A. R. KENNEDY, Managing Editor  
J. H. MOORE, Technical Editor  
T. H. FENNER, Associate Editor  
J. H. RODGERS, Montreal Editor



SUBSCRIPTION RATE  
Canada, \$4.00; United States, \$4.50; Great Britain, Australia and other colonies 17s. per year other countries, \$5.00. Single copies 25c. Advertising rates on request.

THE MACLEAN PUBLISHING COMPANY, LIMITED

143 UNIVERSITY AVENUE,  
TORONTO, CANADA

JOHN BAYNE MACLEAN, President  
H. T. Hunter, Vice Pres. H. V. Tyrrell, Gen. Mgr.

### Must Act Quickly Now

THE charge has been made several times that Canadian firms are not very keen on following up chances to open accounts. Those who have had experience with Canadian business methods abroad find fault with them in many cases, and charge that strict attention to mail and requests for information would be the means of helping to secure quite a lot of business that is going elsewhere.

The purchasing agent of a manufacturing concern in Canada told a representative of Canadian Machinery of an experience his firm had in the last few weeks. They were in the market for a large quantity of work, as their business in this country is largely an assembling proposition, although the parts, in the great majority of cases, are made in shops in this country.

Recently a request was sent out asking for firms that were interested in doing certain parts of their work to make the fact known. It was not a small piece of business, either, but one that would keep a good many shops running comfortably for a spell.

The letter was sent to six firms. On the day following a wire was received from one firm saying that their salesman would arrive on the first train. The purchaser at once thought he was going to have a procession of salesmen at the plant, and get their wants attended to at once.

Four of the firms replied on the fifth or sixth day, and they each stated that they could handle the work if the firm in question sent on the blue prints and allowed them to figure on them.

The sixth firm has not been heard from yet, according to information received a few days ago.

The firm that sent up a salesman the day following the receipt of the letter received a sample order and is having it done in his plant, and the chances are that he will land a good deal more of the work, provided he can do the work to the satisfaction of the customer.

Business is for the man who is after it hard at present. There are very few orders being placed on platters and carried in just now.

### A Possible Solution

THE composite ton of steel was worth, at last reports, \$43.05. By this is meant the average price of a ton of pig iron, billets, slabs, sheet bars, wire rods, steel bars, plates, structural shapes, black, galvanized and blue annealed sheets, tin plate, wire nails and black pipe. In February it was \$48.81, and in March of 1920, \$68.66. In May of 1914 the figure stood at \$22.99.

Judge Gary, of the United States Steel Corporation, in annual report to stockholders, recommends as a possible solution of or antidote to labor union problems, publicity, regulation and reasonable control through Government agencies. Both organized capital and organized labor should be placed under these regulatory laws. Each should be entitled to the

same protection, and be subject to the same restrictions and provisions.

It is significant, says Iron Trade Review, that although hundreds of attempts have been made to place the direct reduction of ore to finished steel on a commercial basis and more than 70 "direct" processes are known, none of these methods, in recent years at least, have been formidable competitors of the conventional process involving the blast furnace and steel melting furnace.

Produce cheaper and produce better than you have ever done before is the solution of the present situation. No easy matter, we know, but there is no other way out. To a very large extent this is a price market at present.

### Important Iron Discovery

SHOULD first reports be true of the recent discovery in the Cobalt district, Canada has added another important link in its industrial chain. It is claimed that the iron content is approximately 70 per cent., but it is more than likely that this figure will be found too high on more careful examination, as 70 per cent. iron is something not met with every day. In any case the presence of iron in mining quantities is very welcome, and the development of this new discovery will be watched with interest.

### WHAT BUSINESS PAPER EDITORS SAY

Continued from page 98

glass slightly, but this will not be a serious factor. German hardware will be affected to the greatest extent by this ruling.

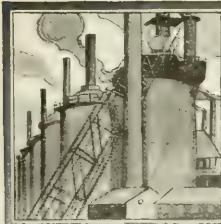
The primary markets have been prominent when related to the production costs of the manufacturer, and declines in these have been felt in many hardware lines. Some marked changes to lower basis have been noted recently, among which are ingot metals; cordage and cotton goods; fuel and lubricating oils; solders, lead products, pipe fittings, corrugated sheets, Canada plate, waste materials, leather and harness parts, some lines of woodenware, tools, standard compression work, galvanized ware, ammunition, rule and level goods, range boilers and valves; boilers and radiators, pumps, etc.

Speaking of the popular sentiment that prices will soon return to pre-war levels, one manufacturer has the following to say:

"When we consider how anxiously everyone is now stewing around to try to determine whether the selling prices will go lower than in pre-war times, it causes one to smile when he thinks of the unanimous decision of all the wise ones that prices would never revert to old figures, because standards of living had raised to such an extent that people would never be satisfied to go back to pre-war prices.

"It is wonderful what a balloon will do in the way of collapsing if it is properly perforated."





## MARKET DEVELOPMENTS



### Buyers Purchasing Immediate Requirements Only

Production of Steel in United States is About One-Third Normal—Demand Approximately at the Same Level—Wage Adjusting Continues—Pig Iron Dull, But Old Material Shows Strength

**R** EPORTS from the steel markets confirm the idea that the present situation is one in which the buyers are pursuing a policy of "laissez faire." The general condition in industry is not what would tend to give much confidence, and what will satisfy the immediate requirements is about all that any consumer wishes to be burdened with. The usual period of dullness which comes in the summer months shows no signs of being lightened this year, but will more likely be accentuated. The production of steel in the U. S. is only about one-third of normal, and demand is at about the same level. There has been some export business booked by the Steel Corporation, about 11,000 tons of rails having been ordered for Japanese railways. There is also enquiry for rails for China, and Argentina is in the market for the same goods.

There is a good deal of wage adjusting going on in the Pittsburgh district, and this adjustment is all downwards, as would be expected. There are also signs that the automobile

trade is about to enter on another quiet period, although the reductions in price which are promised for the end of June will perhaps have a stimulative effect on this trade.

The pig iron market remains dull for the most part, although there are some slight spots where a better business has been done. This has been in the line of supplying iron for special contracts, the prices remaining about the same as last week.

The old material market is stronger in U. S. centres, the steel grades showing better than the others. Dealers are stocking up their yards in the hope of realizing on a rising market, and this tends to keep prices firm.

Locally the demand for small tools and supplies continues to improve, and the market for structural shapes shows an upward tendency. Machine tools still stay in a comatose condition, but dealers generally are rather optimistic as to this market's immediate future.

### CONSUMERS CONFINE BUYING TO SUPPLIES FOR IMMEDIATE NEED

**M**ONTREAL, Que., May 23.—Apart from the announcement here and there of slight betterment in business, the general tone is not one of promise for the near future. Dealers here now think that the coming weeks will be exceptionally quiet with very light inquiry. The warm weather and the holiday season will add to the dullness in industry, and prediction seems to favor a summer of quiet activity. Railroad shops here are again closing for a period of ten days, owing to business depression.

#### Dullness in Steel

"One feature of present inactivity," said a steel dealer here, "is the spasmodic buying that develops from time to time, and from many varying quarters. Just last week we had a fairly large order from a concern that has not bought for months. Everywhere we find that consumers are refraining from taking on any stocks and confine their buying to such supplies as will carry them over

for the immediate present. In the light of clearing the decks of industrial plants this process is a good thing and should eventually prove beneficial and provide a good foundation for future construction, but it does not add to present activity." One dealer here reports some nice orders for wire rope. The plate demand in the district is almost nil, the railroads being quiet and shipyards doing only repair work. Steel production is said to be falling off and with foreign interests coming into the market it is not unlikely that the trade may see price declines in a short time.

#### Quiet Week in Machine Tools

District machine tool activity might be summed up in the three words, "very little improvement." There continues to be little inquiry for general supplies and for some lines of wood-working machinery, but the movement of metal working tools has shown no improvement. "We are entering a period which, in normal

times, is credited with decreasing industrial activity, and it would not be surprising to see the next month or so featured by pronounced dullness in the movement of tools and supplies. The business now carried on is hardly sufficient to meet overhead charges, and very frequently the week will show a balance on the wrong side of the books. However, we still have hopes of a late summer revival."

#### Scrap Very Quiet

Complete absence of interest is shown by old material merchants, as there is little inducement to carry on business just now owing to the stagnant condition of the market. Little movement is reported and dealers with stocks on hand are reluctant to release material at prevailing figures, realizing that to do so would mean financial loss in many instances. "Quoting prices has no effect on the situation," said a dealer, "consumers are not buying on a basis of price, but only when they need scrap, and then the price is decided on according to the nature of the sale and the conditions involved. Almost any price might be quoted without awakening the

interest of buyers." What little movement is reported seems to favor the non-ferrous lines. Quotations on these are quite firm while steels are nominal.

## CONFIDENCE EXPRESSED FOR THE FUTURE

TORONTO, May 26th.—The spurt in business experienced by a few Toronto dealers and recorded in Canadian Machinery continued last week and is still being felt to some extent. Machine tools are quiet, also woodworking machinery. What activity there is is pretty well confined to small tools and supplies. This would indicate, as we have said before, a policy of hand-to-mouth buying. According to reports received in connection with a questionnaire sent out by Canadian Machinery to a number of metal-working concerns, business to date as compared with the same period last year trade is (on the average) about fifty per cent. below 1920. Considering that 1920 was an exceptionally good year this is encouraging. It explains the demand for necessities. The difficulty in making collections and the unsettled condition of things in general accounts for lack of buying on a larger scale. Dealers are sitting pat, picking up what business they can, optimistically awaiting the return of the buyer who even now is figuring on his requirements. One leading dealer expressed his confidence in the future and as evidence of his optimism outlined an aggressive sales and publicity campaign. Another dealer was of the opinion that a good deal of business could be done on long term financing, indicating that there is business in the background, but little cash to finance it.

### Steel Business Shows Improvement

A report received by a Toronto house indicated a marked improvement in the market for certain lines of steel, largely accounted for by renewed demand by automobile manufacturers, and for structural steel plates. This condition has been reflected in the Canadian business of this concern especially in Ontario where considerable improvement was noted. Another jobber reported business in the mining district as fairly good, trade with other industries being very quiet.

Little change is noted or expected in the scrap metal market. Little business is being done.

## U.S. TOOL MARKET IS VERY DULL NOW

Small Orders Only—Cranes Move In  
Small Lots—Cleveland Also  
Reports a Dull Season

New York, May 26.—A dearth of demand prevails in the local machine tool market. Sellers assert there is no noticeable improvement in buying. The larger inquiries which have been reported, virtually all of which are from abroad, still are pending. Some buying by Cuban sugar interests of pipe fitting machinery

## POINTS IN WEEK'S MARKETING NOTES

Inquiries are being made in the Buffalo market, asking for prices on quantities of iron for last half of the year delivery. This marks a departure from the policy which has prevailed for many months.

Scrap metal market at Pittsburgh shows a stronger tendency in the steel works grades. Some dealers continue to stock their yards in anticipation of a higher market. Trading is practically at a standstill at San Francisco.

Consumers are refraining from taking on stocks, confining their buying to immediate requirements. Some nice orders have been received for wire rope, and various enquiries have been made for general supplies, also certain lines of woodworking machinery. Metal working tools show no improvement, however.

One concern has announced the elimination of the eight-hour day and the substitution of straight time. This means roughly a reduction in wages of about 9 per cent.

The market for structural shops shows an improvement locally.

Small tools and supplies still continue favorable, but machine tools are rather inactive. Dealers in this latter line are, however, optimistic as to its future.

Consumers of scrap are not buying on a basis of price, but only when they need scrap. What little movement is reported seems to favor the non-ferrous lines.

and other equipment is noted, but this has been in evidence for several weeks and has not developed into business of special importance. However, in one or two instances some sizable buying is expected in the relatively near future. One is a list of approximately \$100,000 of miscellaneous machine tools for a leading railroad in China, issued through the Wah Chang Trading Corp., 233 Broadway. Another is a list of equipment issued several weeks ago by the Japanese government for equipment for installation in its arsenals. Proposals some time ago were forwarded to Japan, and bidders are expecting a definite decision soon. A recent inquiry calls for a number of power presses for a Chinese mint. Domestic demand is comprised principally of inquiries for single machines.

Demand for cranes is listless. New inquiries are coming out slowly and orders are few. Sellers report several projects in prospect, but are not confident of business resulting soon. Recent inquiries include a 10-ton electric crane, with 47-foot span for the Foundation Co., 120 Liberty Street. A handpower crane of similar dimensions is specified as an alternate. A 15-ton electric crane, with 50-foot span, is to be bought by the Equipment Corp. of America. A 15-ton locomotive crane with 40-foot boom is being inquired for by L. B. Foster, 154 Nassau Street.

Cleveland, May 26.—Users of machine tools and equipment continue to confine their purchases to single units and repair parts. In the week just past demand even in this line was slack and dealers report there is little general activity other than that coming from the automotive trade. As yet orders and inquiries from the automobile industry are confined to single machines.

Prices continue weak although no new reductions have been noted. On the other hand dealers are known to be shading whenever necessary. A note of cheerfulness is reflected in the market, due to the better credit conditions. Dealers report bills are now being paid more promptly.

## RUSTLESS STEEL

According to the Vossische Zeitung, the Krupp works are paying special attention to the production of rustless steel, for which during the war there was an urgent demand as a substitute for platinum. The Krupp rustless steel contains a large amount of chrome, and is said to be remarkable for its hardness and strength. Its resistance to chemical influence is such that it is not affected by boiling nitric acid. One of the uses for which it is particularly proposed to apply it is as a substitute for nickel-plated metal in the manufacture of instruments. The firm is also studying the question of using rustless steel in the manufacture of plates for artificial teeth in place of the gold or vulcanite now generally employed.

## TWENTY-EIGHT YEARS' SERVICE

According to a statement made at the convention of the American Wood Preservers' Association, creosoted wood-stave pipes put in place twenty-eight years ago are still in perfect condition. The best method of treatment for the staves was described as being the empty-cell process with 50 pounds initial air pressure, following the creosote pressure period with several minutes' re-heating at about 25 degrees Fah. in excess of any previous temperature, then a vacuum of not less than 20 inches maintained for from 30 minutes to one hour. By this process a satisfactory creosote penetration is obtained, and the staves come out thoroughly clean, and so dry as scarcely to soil the hand.



## PRACTICALLY NO PRICE-CUTTING; STEEL PRODUCERS ARE NOT ALARMED

Pittsburgh, May 26.—Production of steel is declining at a slow rate. Measured by ingot output it was about 31 per cent. of capacity in April and is now a share below 30 per cent., while the indications are that a rate of 25 per cent. or less will be reached by July. That prediction is based on the fact that specifications and orders are coming in at a slightly lower rate now than a few weeks ago.

July is invariably a dull month in the steel market. Even in 1916, an extremely active year, the market was dull in both June and July, and this led to expectations in some quarters that the market would go off permanently, but it took a fresh start in August. Inasmuch as nothing good can be expected in July and we are only a few weeks from July now, it is regarded as certain that no definite improvement can occur in the near future. Predictions of improvement are now centering more definitely around the month of August, when a few weeks ago some predicted August, some September and some October. What is being predicted for later in the year is not a complete revival, but an improvement. Full operation of the steel industry is not expected before next spring at the earliest. It will be seen that if mill operations are 25 per cent. in July and become 50 per cent. in September, the 50 per cent. rate would be a very low one, but on the other hand it would represent a doubling in output, which would look very good. Before the war the steel industry had an idea that no combination of circumstances could put a demand to a point below 50 per cent. of capacity, and as a matter of fact there was never, before the war, an operation under 50 per cent. at any time. The capacity now, of course, is much larger.

### Attitude of Steel Mills

A notable fact in the situation, one that does not attract the attention it deserves, is the complaisance with which steel producers view the situation. They are not alarmed or perturbed or even particularly impatient. What is their philosophy? It is one that is common to the majority of business men today, that there must be a general and complete readjustment and that no one can expect real business activity until the adjustment is finished. Indeed, the philosophy goes farther than that, that no one should want a revival in business until the adjustment is completed, because such a revival would represent a false start, on an unsound economic basis, and there would be fresh trouble later.

Of course everyone would be much better satisfied if the readjustment should be completed suddenly, but it is recognized that it cannot be and men therefore are patient. An important point is that business men know, or at

least are convinced that they know, just what they are waiting on, and they can read signs from day to day of how the readjustment is proceeding so that they can judge of the progress being made. There are various things needed for completion of the readjustment, but two things are picked out as the hardest and slowest and it is assumed that all the others will come around in ample time for these two, so that they are the ones to be watched.

These two are declines in retail prices commensurate with the declines in wholesale prices, so that the cost of living will be lowered by reasonable amount, and declines in those wage rates that are too high. When the readjustment started no one knew how far prices would decline or how far they ought to decline to produce a safe basis. Now, however, there have been such declines in some commodities and some wage rates that they can be used as a measuring stick for the others. Perhaps some of the prices and wage rates are a little too low now and will advance, but the advance would not be large and the decreases awaited are large. Thus tin, copper, zinc, lead and antimony have lately been below their pre-war averages and possibly that is a little too low, but building materials according to the latest report of the Bureau of Labor at Washington are 103 per cent. above their 1913 average and housefurnishing goods are 174 per cent. above. Everybody except those who are trying to sell these is agreed that they are altogether too high. The farmer in particular realizes that, when according to this same report farm products are only 15 per cent. (all figures refer to wholesale prices) above their 1913 average.

As to wages, the building trades are still holding out for an average of more than a dollar an hour, whereas common labor is available in many regions at 30 cents or less.

It is on account of this philosophy that the steel trade holds that the most favorable piece of news as to the prospects of the steel industry for the future that has come out for many weeks past was the announcement made last week by the Railroad Labor Board that a reduction in railroad wages is justified by present conditions. The steel trade would expect to profit by the railroads getting into better financial position, by saving money on payrolls and by having their borrowing power increased at the same time, but the more important influence of the railroad wage announcement, in the minds of steel makers, is the bearing it has upon wage rates generally, for it is expected to encourage wage declines in other directions, particularly in the building trades. In other words, the steel industry feels that the cost of consuming steel is too high

and must come down before steel can be bought in large quantities. As to the prices of steel products, the steel mills will make the proper prices when buyers get in position to take hold.

### Prices Steady

The new prices developed for steel products in the fore part of April are being very well maintained. Occasionally there may be a concession on an order much larger than the usual run, but on ordinary business prices are strictly by the card. There is practically no incentive to cut prices. Costs are high, with a mill running right along at 25 to 35 per cent. of capacity, or operating 50 per cent. in alternate weeks, or with a manufacturer who closes one plant and keeps a second plant operating at 50 or 60 per cent. The only way to decrease cost just now would be by a larger operation, and price cutting would not do that. Costs will come down some when freight rates are reduced, but it will be two or three months before that subject is even taken up. Here and there a slight further reduction in wages is being made by steel mills, but in general the recent reductions are likely to stand for some time, common labor being 33 to 37 cents an hour, with time and a half for hours over eight in a day. The Cambria Steel Company is reported to have reduced to 30 cents lately, without overtime, while the Republic Iron & Steel Company, paying 37 cents, is reported to have cut out the extra payment for overtime.

## Pig Iron Market

THE pig iron market continues dull with a tendency toward further concessions. Reports indicate that in some sales made at distant points, at least one producer on the lakes has shaded the market freely. A New Jersey cast iron shop purchased about 6,000 tons, this being the only transaction of fair size on the market.

Pittsburgh reports that the past week has been one of the duller the trade has ever experienced since the recession in buying developed last fall. A sale was made of 2,000 tons of basic iron to a Valley steel maker at \$22 Valley furnace, and this business was taken by a merchant producer. Standard Bessemer still is quoted at \$24, Valley furnace, but there are only a few carload sales to support this quotation. It is believed that a firm offer of less than \$22 for basic iron would get consideration from some merchant producers to-day.

The Chicago market is quiet with only small sales to break the monotony; 200 tons of No. 1 foundry was bought by a Michigan melter at \$23.50 Chicago furnace or \$23 base for No. 2 material. Most sales from furnace continue to be made on a \$23 base, but a few transactions have been closed at \$22.50.

A cast iron pipe shop, which recently

took a contract for 6,000 tons of pipe, has purchased pig iron and scrap with which to make the pipe. One company is reported to have taken 2,500 tons of the pig iron at \$23.50 furnace base, and another about the same tonnage at about \$24 furnace. Definite announcement as to price has not been made public. Sales for the past week in New York aggregated about 10,000 tons.

The largest sale reported on the Cincinnati market during the week was a sale of 250 tons of malleable iron. Several 100-ton lots were sold, but the majority of the transactions were for carload lots and even these were few. Chicago iron is being quoted in this district and some sales are said to have been made on a \$22 furnace basis. There is no activity in basic and the quotation of \$24 is only nominal.

Inquiries have been made on the Buffalo market by several buyers, asking prices on quantities of iron for last half of the year delivery. The total inquiry of this kind is slightly less than 3,000 tons, but it marks a departure from the policy which has prevailed among buyers for many months. Foundries have not been interested in any future deliveries. Shipping on old contracts has not improved. An unusual development has been reported, namely the sale of 250 tons at \$30 base by a furnace which has been out of the market by reason of determination to hold to a \$30 price.

The local market at Philadelphia continues dull, aside from several fairly large sales of foundry iron to cast pipe manufacturers. Most foundries are calling only for carload lots for prompt shipment. A new Jersey pipe manufacturer about 6,500 tons of No. 2 plain iron, some or all of which was sold at \$23.50 f.o.b. furnace. A small tonnage of gray forage was sold last week at \$24.50 furnace. One company in this district which has all of its furnaces idle expects to put one in blast soon, probably on malleable iron.

On the Cleveland market there is a slight improvement in the demand for foundry iron in small lots for prompt shipment. Prices are about 50 cents a ton lower with quotations ranging from \$23.50 to \$24, but some furnaces are making sales at \$23 and possibly lower to consumers with whom they have high-priced contracts and who are averaging down their costs by taking part high-priced iron and part present-priced iron. Generally, consumers are buying only for immediate requirements and that policy is bringing about many orders for car lots.

## Scrap Metal

THE scrap metal market at Pittsburgh has shown a stronger tendency in the steel works grades, largely as a result of some fairly sizable purchases by a large independent steel company

during the last ten days. This interest recently paid \$13.50 for a fair sized lot of heavy melting steel. One dealer now is offering \$14 delivered this district, for heavy melting grade, and this is probably as low as any now can be bought.

On the Chicago market the dealers continue to buy material to stock in their yards, in anticipation of a higher market, and in many cases are paying more for this scrap than consumers are now willing to pay. This speculative activity is reflected in a number of advanced quotations.

New York reports a better feeling in the trade which has been reflected in slight price raises in a few items, notably heavy melting steel. Some of the mills from which nothing has been heard for weeks are sending out inquiries and buying small quantities.

Greater inquiry on the Buffalo market indicates to dealers improved furnace operation, and an advance in the price of heavy melting steel may come. A few dealers report a better week than any in recent months. Several sales of No. 1 machinery cast at \$18 have been reported.

The tone of the Philadelphia scrap market is stronger, and dealers are not anxious to sell at present quoted prices because of the difficulty in covering on their orders at a profit. An eastern steel plant made purchase of about 1,000 tons last week at \$12 to \$12.50 delivered, but is now offering \$12.

On the whole the scrap market at Cleveland is very dull. Purchases of heavy melting steel by local consumers are reported at \$11.50 to \$12.50, the higher price being paid for the best quality of scrap. The low prices that are being quoted on machine shop turnings are bringing out very little material. Dealers are offering \$8.25 for mixed borings and short turnings, which are slightly lower.

Trading is practically at a standstill at San Francisco, in the scrap market. No sales of consequence have been reported recently. Prices are nominal at \$12 gross ton delivered at the mill for heavy melting steel, and \$30 for cast iron scrap.

## WATCH THE SCRAP HEAP

SAVING \$50,000 a year sounds like a large-sized proposition, but, according to a story going the rounds about the superintendent of a large chemical and fertilizer plant in New Jersey, it is very easily accomplished. He claims he has saved his company \$150,000 in the past three years, largely because of his ingenuity in applying the oxy-acetylene welding and cutting process. Much of this saving resulted from utilizing materials salvaged out of the scrap pile for the fabrication of equipment that would otherwise have been purchased new.

From the foregoing it would appear that the oxy-acetylene process as commonly practised in production and repair may be profitably extended to embrace

a variety of economic operations that in many plants are entirely overlooked.

As in a general way the same class of opportunities may apply to manufacturing plants of other kinds, references to the typical fabrications at the plant noted ought to be of suggestive value. The principal ones are briefly outlined as follows:

In one instance a 4-inch steam pipe-line, 300 feet long and carrying 150 pounds pressure, was constructed of second-hand pipe sections joined by butt-welding. This line was put in service three years ago, and has not shown the slightest trace of a leak at any point.

Another instance of the use of scrap material was the fabrication of two oil and water separators from old pipe. These separators were more compact and workmanlike than the manufactured article.

Another example of the use of scrap pipe was the building of a degreasing condenser from this material. The original condenser was built of screwed pipe and fittings and the loss through leakage of gasoline amounted to 18 gallons for every ton of fertilizer degreased. In the improvised welded condenser the loss was reduced to 3½ gallons per ton.

In the conversion of a coal burning power plant to burn oil, \$2,160 worth of assorted pipe fittings were saved by welding in small nipples instead of cutting the main line and inserting "tees."

On another job thousands of pipe clamps and bolts were eliminated by welding electric conduit tubing to the web of "I"-beams.

In another case 5 feet "U" bends were made from scrap pipe. These bends, in which the oxy-acetylene flame was used, were not so symmetrical and uniform as the manufactured article, but were much cheaper and proved highly efficient in service.

The oxy-acetylene blowpipe was used also in making stairways and handrails. For treads 6-inch by ½-inch steel channels were welded, hollow side up, to steel channel stringers. The treads were filled in with steel borings and cement to make a non-skid surface. The verticals were welded to the sides of the stringer channels, the handrail being laid in a round groove at the top of the verticals, thus completing, after being welded, a staircase that was rigid and permanent. This application eliminated numerous railing fittings and adjustments at various angles of the stairways.

C. Verne Somerville, Superintendent of the Canadian Electrical Steel Company's plant at Montreal, and formerly well known in the electrical industry in Toronto, was accidentally killed while at work on May 21. While in Toronto, Mr. Somerville was employed with the Canadian General Electric Company, and British Forgings, Ltd.



# SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

## PIG IRON

|  |         |
|--|---------|
| Grey forge, Pittsburgh .....           | \$25 00 |
| Lake Superior, charcoal, Chicago. .... | 40 50   |
| Standard low phos., Philadelphia. .... | 41 50   |
| Bessemer, Pittsburgh .....             | 28 96   |
| Basic, Valley furnace .....            | 26 00   |
| Toronto price:—                        |         |
| Silicon, 2.25% to 2.75% .....          | 34 10   |

## IRON AND STEEL

|   |        |
|---|--------|
| Per 100 lbs. to Large Buyers .....              | Cents  |
| Iron bars, base, Toronto .....                  | \$3 75 |
| Steel bars, base, Toronto .....                 | 3 75   |
| Iron bars, base, Montreal .....                 | 3 75   |
| Steel bars, base, Montreal .....                | 3 75   |
| Reinforcing bars, base .....                    | 3 75   |
| Steel hoops .....                               | 4 75   |
| Tire steel .....                                | 4 00   |
| Spring steel .....                              | 6 00   |
| Band steel No. 10 gauge and 3-16 in. base ..... | 4 00   |
| Chequered floor plate 3-16 and heavier .....    | 6 00   |
| Bessemer rails, heavy, at mill. ....            | 2 35   |
| Steel bars, Pittsburgh .....                    | 2 10   |
| Tank plates, Pittsburgh .....                   | 2 20   |
| Structural shapes, Pittsburgh .....             | 2 20   |
| Steel hoops, Pittsburgh .....                   | 3 05   |
| F.O.B., Toronto Warehouse                       |        |
| Small shapes .....                              | 4 50   |
| F.O.B. Chicago Warehouse                        |        |
| Steel bars .....                                | 3 48   |
| Structural shapes .....                         | 3 58   |
| Plates .....                                    | 3 78   |
| Small shapes under 3-in. ....                   | 3 48   |

## FREIGHT RATES

|                                |                 |
|--------------------------------|-----------------|
| Pittsburgh to Following Points | Per 100 Pounds. |
|                                | C.L. L.C.L.     |
| Montreal .....                 | 58 3/4 73       |
| St. John, N.B. ....            | 84 1/2 106 1/2  |
| Halifax .....                  | 86 108          |
| Toronto .....                  | 38 54           |
| Guelph .....                   | 38 54           |
| London .....                   | 38 54           |
| Windsor .....                  | 35 50 1/2       |
| Current surcharge, 7 per cent. |                 |

## METALS

|                     |         |          |         |
|---------------------|---------|----------|---------|
|                     | Gross.  | Montreal | Toronto |
| Lake copper ..      | \$18 00 | \$17 50  |         |
| Electric copper ..  | 17 50   | 17 50    |         |
| Castings, copper .. | 17 25   | 18 00    |         |
| Tin .....           | 38 00   | 39 00    |         |
| Spelter .....       | 7 75    | 7 50     |         |
| Lead .....          | 7 25    | 7 50     |         |
| Antimony .....      | 8 00    | 8 25     |         |
| Aluminum .....      | 34 50   | 30 00    |         |

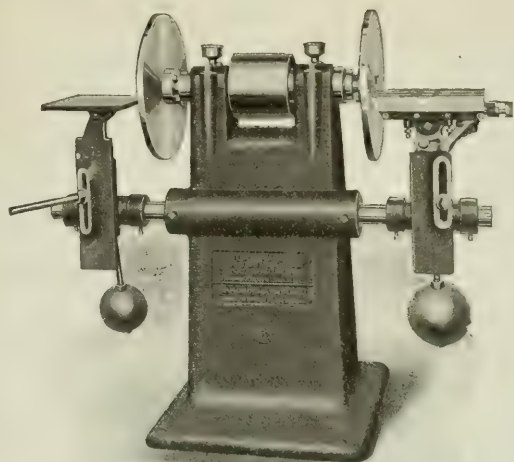
Prices per 100 lbs.

## PLATES

|                       |        |        |
|-----------------------|--------|--------|
| Plates, 3-16 in. .... | \$5 00 | \$4 75 |
| Plates, 1/4 up .....  | 4 50   | 4 25   |

## PIPE—WROUGHT

| Standard Butt Weld Pipe S/C |         |         |                |       |  |
|-----------------------------|---------|---------|----------------|-------|--|
| Per 100 feet.               |         |         |                |       |  |
| Size                        | Steel   |         | Gen. Wrot Iron |       |  |
|                             | Blk.    | Galv.   | Blk.           | Galv. |  |
| 1 1/2 in. ....              | \$ 6 20 | \$ 8 50 |                |       |  |
| 1 3/4 in. ....              | 4 89    | 6 99    | 5 91           | 8 01  |  |
| 2 in. ....                  | 4 99    | 6 99    | 5 91           | 8 01  |  |
| 2 1/2 in. ....              | 8 50    | 8 03    | 7 35           | 9 45  |  |
| 3 in. ....                  | 7 99    | 10 06   | 9 95           | 12 05 |  |
| 3 1/2 in. ....              | 11 82   | 14 88   | 14 71          | 17 77 |  |



## DIAMOND DISC GRINDERS

Good grinding in fast time has made the Diamond popular in a host of shops. The right design and build eliminate vibration and give the operator a perfect surface every time. There is a suitable size and equipment for every surface grinding job you have. Workmanship and material of "Diamond" quality throughout.

May we send you catalogue?

### The A. R. Williams Machinery Company, Limited

ST. JOHN, N.B.  
WINNIPEG, VANCOUVER

*If It's Machinery, Write "Williams"*

64 Front Street West  
TORONTO

## The Week's Events in Montreal Industry

Charles P. Archibald, who for a number of years has served in the capacity of secretary for the Young Men's Canadian Club of Montreal, was elected to the office of president last week.

\* \* \*

In connection with the construction of the new \$6,000,000 Mount Royal Hotel that will shortly be commenced in Montreal, it has been announced that D. H. McDougall, assistant to the manager of the Toronto Power Company, has been appointed secretary-treasurer of the Mount Royal Hotel Company, and that he will have full charge of the construction arrangements.

\* \* \*

The St. Lawrence Welding Works have changed their name to the St. Lawrence Welding and Engineering Works, Limited. This change was deemed necessary owing to the increased activities that the firm is now engaged in. In addition to welding of every description the firm carries on a general repair business, present marine contracts necessitating increased staff and operating hours.

\* \* \*

Absence of freight in sufficient volume

on the various railroads has again necessitated the closing down of the railroad repair shops in this district. Both the Point St. Charles shops of the Grand Trunk and the Angus shops of the C.P.R. will be closed from May 20 to June 1. It is expected that next month will see some adjustment in regard to the wages now paid to railroad operators.

\* \* \*

The Dominion Steel Co. announce a change in the hours of work at the Sydney plant. For some time the works have been operating at irregular intervals, employing some 900 men, but this week it was found necessary to close down entirely. When operations are again started in the course of a week or so, it is the intention of the company to confine the working days to two a week.

\* \* \*

W. J. Brown, manufacturers' agent, 117 Youville Square, Montreal, has secured the Eastern Canada agency for Byrne and Griffith, of Birmingham, Eng., manufacturers of steam and hydraulic fittings, and motor car gauges. It might be stated that Payne and Griffith has purchased the sole right to manufacture

the Probert and Bridges line of high and low detectors for steam boilers.

\* \* \*

For the first time in its history the U. S. Iron and Steel and Heavy Hardware Association will hold its convention this year in Canada, and the place selected is Montreal. This will be the twelfth annual meeting of the association and will take place on June 7, 8 and 9. The headquarters of the gathering will be at the Windsor Hotel. All of the large steel interests in the States and Canada will be represented. A meeting of the Montreal branch of the Metal and Hardware Association will be held this week to make arrangements for the visiting delegates.

\* \* \*

A glance into future methods of conducting urgent business may be gathered from the fact that Thos. Hall, of the Hall Engineering Works, Montreal, took advantage of the newly inaugurated Canadian Aerial Service, operating in conjunction with Bramson Limited, to pay a "flying" visit to Cornwall this week, in connection with some contracts of the firm. A trip that would otherwise consume several hours at the convenience of the railroad, was completed in about one hour.



## MISCELLANEOUS

|                                      |       |
|--------------------------------------|-------|
| Solder, strictly                     | \$ 25 |
| Solder, guaranteed                   | 0 27  |
| Soldering coppers, lb.               | 0 62½ |
| White lead, pure, cwt.               | 17 00 |
| Red dry lead, 100-lb. kegs, per cwt. | 13 00 |
| Linseed oil, boiled, single bbls.    | 1 03  |
| Wood alcohol, per gal.               | 2 75  |
| Whiting, plain, per 100 lbs.         | 3 00  |

## CARBON DRILLS AND REAMERS

|   |          |
|---|----------|
| A.S. drills, wire size                  | 40 and 5 |
| Can. carbon cutters, plus               | 10       |
| Standard drills, all sizes              | 40 and 5 |
| 3-fluted drills, plus                   | 10       |
| Jobbers' and letter sizes               | 40 and 5 |
| Bit stock                               | 50       |
| Ratchet drills                          | 10       |
| Pure turp., single bbls., gal.          | 1 20     |
| Linseed oil, raw, single bbls.          | 1 00     |
| S.S. drills for wood                    | 25       |
| Wood boring brace drills                | 40       |
| Electricians' bits                      | 30       |
| Sockets                                 | 50       |
| Sleeves                                 | 50       |
| Taper pin reamers                       | 25 off   |
| Drills and countersinks                 | Net      |
| Bridge reamers, carbon                  | 50       |
| Centre reamers                          | 5        |
| Gasoline, per gal., bulk                | 0 42     |
| Chucking reamers                        | Net      |
| Hand reamers                            | 10       |
| High speed drills, list net to plus 20  | 10       |
| Can. high speed cutters, net to plus 10 | 10       |
| American                                | plus 40  |

## COLD ROLLED STEEL

[At Warehouse]

|                    |             |
|--------------------|-------------|
| Rounds and squares | \$7.00 base |
| Hexagons and flats | 7.00 base   |

## IRON PIPE FITTINGS

|   | Black | Galv. |
|---|-------|-------|
| Class A   | 60    | 75    |
| Class B   | 26    | 36    |
| Class C   | 17    | 26    |
| Cast iron fittings, 5%; malleable bushings, 22½%; cast bushings, 22½%; unions, 37½%; plugs, 20% off list. |       |       |

## SHEETS

|                                   | Montreal | Toronto |
|-----------------------------------|----------|---------|
| Sheets, black, No. 28             | \$ 6 00  | \$ 6 50 |
| Sheets, blue ann., No. 10         | 5 25     | 5 50    |
| Canada plates, dull, 52 sheets    | 7 50     | 13 00   |
| Can. plates, all bright           | 14 00    |         |
| Apollo brand, 10½ oz., galvanized |          |         |
| Queen's Head, 28 B.W.G.           | 10 75    |         |
| Fleur-de-Lis, 28 B.W.G.           | 10 00    |         |
| Gorbals Best, No. 28              |          |         |
| Colborne Crown, No. 28            |          |         |
| Premier, No. 28, U.S.             | 8 25     | 8 50    |
| Premier, 10½-oz.                  | 8 25     | 8 90    |
| Zinc sheets                       | 13 00    | 15 00   |

## PROOF COIL CHAIN

(Warehouse Price)

B

|  |  |
|--|--|
| ¼ in., \$13; 5-16, \$11; ¾ in., \$10; 7-16 in., \$9.80; ¾ in., \$9.75; ¾ in., \$9.20; ¾ in., \$9.30; ¾ in., \$9.50; 1 in., \$9.10; Extra for B.B. Chain, \$1.20; Extra for B.B.B. Chain, \$1.80. |  |
|--|--|

## ELECTRIC WELD COIL CHAIN B.B.

|   |  |
|---|--|
| ¼ in., \$16.75; 3-16 in., \$15.40; ¾ in., \$13; 5-16 in., \$11; ¾ in., \$10; 7-16 in., \$9.80; ¾ in., \$9.75; ¾ in., \$9.50; ¾ in., \$9.30. |  |
|---|--|

Prices per 100 lbs.

## FILES AND RASPS

|                        | Per Cent. |
|------------------------|-----------|
| Globe                  | 50        |
| Vulcan                 | 50        |
| P.H. and Imperial      | 50        |
| Nicholson              | 32½       |
| Black Diamond          | 27½       |
| J. Barton Smith, Eagle | 50        |
| McClennand, Globe      | 50        |
| Delta Files            | 20        |
| Disston                | 40        |
| Whitman & Barnes       | 50        |
| Great Western-American | 50        |
| Kearney & Foot, Arcade | 50        |

## BOILER TUBES

| Size                                     | Seamless | Lapweld |
|--|----------|---------|
| 1 in.                                    | \$26 00  | \$..... |
| 1½ in.                                   | 27 25    |         |
| 1½ in.                                   | 26 25    | 29 50   |
| 1¾ in.                                   | 29 75    | 27 00   |
| 2 in.                                    | 29 25    | 24 50   |
| 2½ in.                                   | 33 00    | 28 50   |
| 2½ in.                                   | 44 75    | 32 50   |
| 3 in.                                    | 49 25    | 40 00   |
| 3¼ in.                                   |          | 43 50   |
| 3½ in.                                   | 63 50    | 43 50   |
| 4 in.                                    | 85 00    | 55 50   |
| Prices per 100 ft., Montreal and Toronto |          |         |

## OILS AND COMPOUNDS

|                                |      |
|--------------------------------|------|
| Castor oil, per lb.            | —    |
| Royalite, per gal., bulk       | 28   |
| Palacine                       | 31   |
| Machine oil, per gal.          | 58   |
| Black oil, per gal.            | 27   |
| Cylinder oil, Capital          | 1.01 |
| Petroleum fuel oil, bbls., net | 11.2 |

## BELTING—No. 1 OAK TANNED

|                                |            |
|--------------------------------|------------|
| Extra heavy, single and double | 15%        |
| Standard                       | 15 and 10% |
| Cut leather lacing, No. 1      | 2 00       |
| Leather in side                | 2 40 3 00  |

## TAPES

|                                  |        |
|----------------------------------|--------|
| Chesterman Metallic, 50 ft.      | \$2 00 |
| Lufkin Metallic, 603, 50 ft.     | 2 00   |
| Admiral Steel Tape, 50 ft.       | 2 75   |
| Admiral Steel Tape, 100 ft.      | 4 45   |
| Major Jun. Steel Tape, 50 ft.    | 3 50   |
| Rival Steel Tape, 50 ft.         | 2 75   |
| Rival Steel Tape, 100 ft.        | 4 45   |
| Reliable Jun. Steel Tape, 50 ft. | 3 50   |

## PLATING SUPPLIES

|                             |        |
|-----------------------------|--------|
| Polishing wheels, felt      | \$4 50 |
| Polishing wheels, bull-neck | 2 00   |
| Emery in kegs, Turkish      | 8½     |
| Pumice, ground              | 06     |
| Emery glue                  | 30     |
| Tripoli composition         | 9½     |
| Crocus composition          | 12     |
| Emery composition           | 11     |
| Rouge, silver               | 64     |
| Rouge, powder, nickel       | 38     |

Prices per lb.

## ARTIFICIAL CORUNDUM

|                          |    |
|--------------------------|----|
| Grits, 6 to 70 inclusive | 8½ |
| Grits, 80 and finer      | 6  |

## BRASS—Warehouse Price

|  |    |
|--|----|
| Brass rods, base ½ in. to 1 in. rod      | 30 |
| Brass sheets, 24 gauge and heavier, base | 38 |
| Brass tubing, seamless                   | 42 |
| Copper tubing, seamless                  | 44 |

## WASTE

|           |     |          |     |
|-----------|-----|----------|-----|
| XXX Extra | 21  | Atlas    | 13  |
| Peerless  | 22  | X Empire | 15  |
| Grand     | 21½ | Ideal    | 18  |
| Superior  | 21½ | X Press  | 13½ |
| X L C R   | 16½ |          |     |

## Colored

|          |     |         |     |
|----------|-----|---------|-----|
| Lion     | 13½ | Popular | 10½ |
| Standard | 12  | Keen    | 9   |
| No. 1    | 14  |         |     |

## Wool Packing

|       |    |        |    |
|-------|----|--------|----|
| Arrow | 35 | Anvil  | 22 |
| Axle  | 23 | Anchor | 17 |

## Washed Wipers

|               |    |              |    |
|---------------|----|--------------|----|
| Select White  | 17 | Dark colored | 13 |
| Mixed colored | 14 |              |    |

This list subject to trade discount for quantity.

## RUBBER BELTING

|          |     |             |     |
|----------|-----|-------------|-----|
| Standard | 10% | Best grades | 15% |
|----------|-----|-------------|-----|

## ANODES

|        |            |
|--------|------------|
| Nickel | .55 to .60 |
| Copper | .38 to .40 |
| Tin    | .70 to .70 |
| Zinc   | .16 to .17 |

Prices per lb.

## COPPER PRODUCTS

|                                       | Montreal | Toronto |
|---------------------------------------|----------|---------|
| Bars, ½ to 2 in.                      | \$30 00  | \$34 00 |
| Copper wire, list plus 10.            |          |         |
| Plain sheets, 14 oz., 14x60 in.       | 32 00    | 38 00   |
| Copper sheet, tinned, 14 x 60, 14 oz. | 38 00    | 42 00   |
| Copper sheet, planished, 16 oz. base  | 44 00    | 48 00   |
| Braziers', in sheets, 6 x 4 base      | 36 00    | 41 00   |

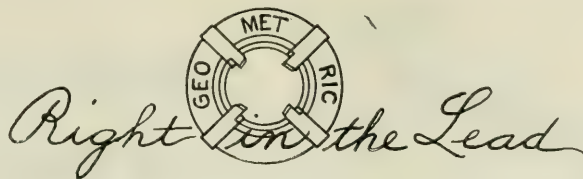
## LEAD SHEETS

|                                       | Montreal | Toronto |
|---------------------------------------|----------|---------|
| Sheets, 3 lbs. sq. ft.                | \$ 9 50  | \$14 50 |
| Sheets, 3½ lbs. sq. ft.               | 9 25     | 14 00   |
| Sheets, 4 to 6 lbs. sq. ft.           | 9 00     | 13 50   |
| Cut sheets, ½ pc per lb. extra.       |          |         |
| Cut sheets to size, 1c per lb. extra. |          |         |

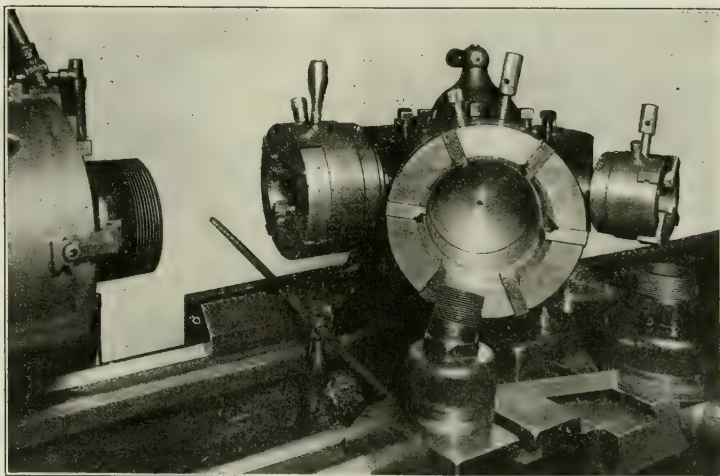
## PLATING CHEMICALS

|                                  |      |
|----------------------------------|------|
| Acid, boracic                    | .25  |
| Acid, hydrochloric               | .03½ |
| Acid, nitric                     | .10½ |
| Acid, sulphuric                  | .03½ |
| Ammonia, aqua                    | .20  |
| Ammonium, carbonate              | .23  |
| Ammonium, chloride               | .22  |
| Ammonium, hydrosulphuret         | .75  |
| Ammonium sulphate                | .30  |
| Arsenic, white                   | .18  |
| Copper, carbonate, annhy.        | .35  |
| Copper, sulphate                 | .10  |
| Cobalt, sulphate                 | .20  |
| Iron perchloride                 | .62  |
| Lead acetate                     | .30  |
| Nickel ammonium sulphate         | 16½  |
| Nickel carbonate                 | .30  |
| Nickel sulphate                  | 17½  |
| Potassium sulphide (substitute). | .40  |
| Silver Chloride (per oz.)        | 1.15 |
| Silver nitrate (per oz.)         | 1.10 |
| Sodium bisulphate                | .13  |
| Sodium carbonate crystals        | .04  |
| Sodium cyanide, 127-130%         | .39  |
| Sodium hyposulphite per 100 lb.  | 6.50 |
| Sodium phosphate                 | .15  |
| Tin chloride                     | .80  |
| Zinc chloride, C.P.              | .30  |
| Zinc sulphate                    | .08  |

Prices per lb. unless otherwise stated



## A Well Dressed Screw Machine Carries a Geometric in Its Turret



A group of Geometric Die Heads at work for The Greenlaw Manufacturing Co.

For close on to fifteen years The Greenlaw Manufacturing Company have used Geometrics, and their General Foreman says they are the kind of Tools that earn, rather than spend the firm's money. In their shop five Geometric Die Heads and six Geometric Collapsing Taps are at work every day. All their screw thread cutting is done with Geometrics.

*A Mechanical Engineer's comment is :*

*Wherever I go I find Geometric Tools accepted as standard.*

**-- A Geometric Will Solve Your Screw Thread Problem --**

# THE GEOMETRIC TOOL COMPANY

## NEW HAVEN CONNECTICUT

*Canadian Agents :*

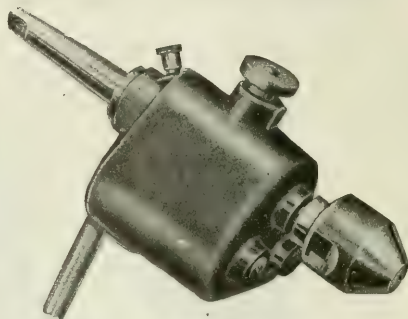
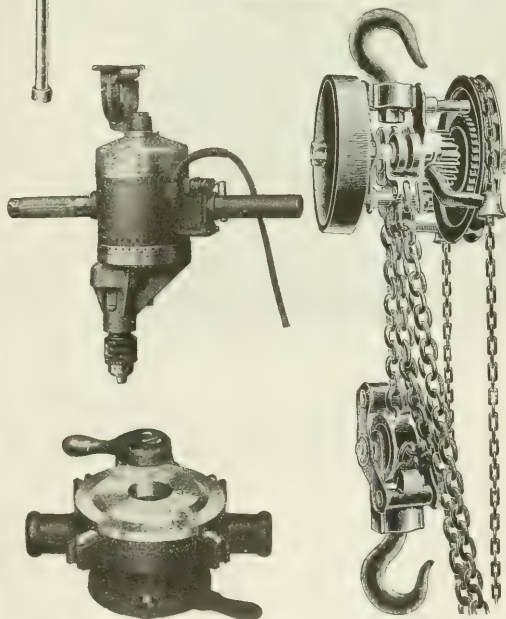
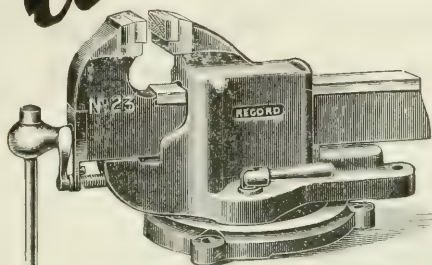
Williams & Wilson, Ltd., Montreal.

The A. R. Williams Machinery Co., Toronto, St. John, N.B., Halifax, N.S.



# Aikenhead's

## Canada's Leading Tool Supply House



### Wahlstrom's Tapping Attachment

THE Wahlstrom prevents tap breakage by keeping the lands free from chips by means of an oscillating motion which duplicates the simple to-and-fro motion of hand tapping. For tapping in soft materials the oscillating motion can be changed to a continuous revolution.

The Wahlstrom fits any drill press. It is made in two sizes. No. 1 takes taps of all sizes from 5-40 to  $\frac{1}{2}$  inch; No. 2 takes taps from  $\frac{1}{4}$  inch to  $\frac{3}{4}$  inch.

# AIKENHEAD

17 Temperance Street

# Everything in Tools

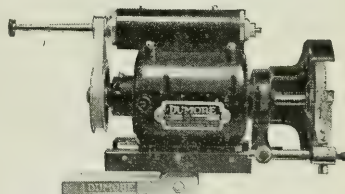
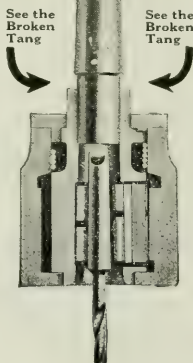
*Wikenhead's*

## Wahlstrom's Automatic Drill Chuck

WITH a Wahlstrom your operator can drill any number of holes of different diameter, one after the other, simply by grasping the chuck with one hand and replacing the loosened drill with another—and two seconds does it! It is not even necessary to stop the spindle.

This Wahlstrom Automatic self-centres the tool perfectly and its instant-acting jaws close on the entire shank in a grip that becomes firmer as the resistance to the tool increases. The clutch can't slip and the jaws never mark a tool.

Made in two styles. One holds Nos. 1, 2 or 3 Morse Taper Shank Tools—with or without tang. The other is made in three sizes:  $15/64$  to  $1/2$  in.;  $3/8$  to  $3/4$  in. and  $17/32$  to 1 in., thus holding all sizes of straight shank tools from  $15/64$  to 1 in. Booklet upon request.

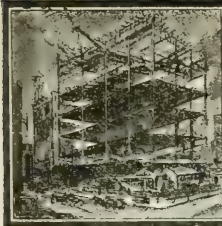


# HARDWARE

LIMITED

Toronto, Ontario





# INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS  
PERSONAL AND TRADE NOTES



## LARGE IRON FIND IN NEW ONTARIO ANALYSIS GIVES OVER 55 PER CENT. IRON

**A**CCORDING to recent report, an important discovery of hematite iron has been made in the Cobalt district. The territory lies within the triangle on the points of which are Cobalt, Porcupine, and Sudbury, and the new deposit lies in the townships of Yarrow and Morel, within 14 miles of the railway at Elk Lake.

### High Grade Ore

The ore is said to be exceedingly high grade, massive hematite, showing in one place over a width of four to five feet, and the owners declare they walked along it for about 150 feet, in which the iron content is approximately 70 per cent. In addition to this massive ore there is a series of four dikes or lenses of quartz and jasper in which the iron content is 55.98 per cent. An analysis from the Morel deposit gave the following results: Iron, 55.98 per cent.; silica, 19.60 per cent.; phosphorus, 0.07 per cent.

Geologists had previously expressed the opinion that nothing more than low-grade iron ore would be found in Northern Ontario, but the ore in sight may be measured in thousands of tons. This information is said to be based on the strength of the opinion of leading mining men and on an analysis made in the Ontario Government ore-testing plant at Cobalt, where some of the ore has been found to contain more than 70 per cent. iron, and with the general analysis showing more than 55 per cent. iron.

The ore occurs in sedimentary rocks, being conglomerate and slate, and its general characteristics are almost identical with the Gogebic iron range, which has made the states of Michigan and Wisconsin world-famous as producers of iron ore. The ore in this new range in Northern Ontario occurs in large lenses, and is traced for close to a mile on the surface.

The discovery was made by Frank Wescott, of Elk Lake, Ontario, and he claims that he knew about the presence of the iron for some years, and has repeatedly shown samples to geologists and told them the district in which he found it. These geologists appear to have disbelieved the story, and refused to accompany the discoverer to his sup-

posed find. It was not until Wescott told his story to B. W. Hartley, a prospector in Cobalt, that he succeeded in receiving attention. Mr. Hartley accompanied Wescott to the scene of the find, and in his own words states that what he saw was "almost unbelievable." He packed out 140 pounds of the ore for testing purposes, and after securing a large acreage of the territory gave out the details.

Hartley and Wescott intend to interest Eastern Canada operators in the development of the deposit, and the general impression is that the discovery may be measured in importance with those of Cobalt and Porcupine.

### Same as Lake Superior

Mining men who are familiar with the Lake Superior regions and the deposits there when shown the ore from the new discovery were heard to remark that it was "Gogebic iron," meaning that it came from the mines on the Gogebic iron range in the Lake Superior region. The new discovery lies in sedimentary formation, conglomerate and slate formation being in evidence, with well-rounded pebbles occurring in the conglomerate. Wescott claims to be familiar with the mining area in Michigan and Wisconsin and declares that the geological structure of the new discovery has many characteristics in common with that big iron field.

Wescott declares that he believes the new deposit in Yarrow and Morel townships may actually be related to the northeasterly continuation of the deposits of the Lake Superior region, which have enabled the United States to lead the world in iron ore production, that country having produced upward of 70,000,000 tons in a single year, the 1919 output amounting to 60,000,000 tons, of which 85 per cent. was taken from the Gogebic, Marquette and Menominee ranges of the Lake Superior region. By way of comparison it may be noted that the iron ore deposits which have been mined to depths of as much as 1,500 to 2,200 feet in the Lake Superior region, are of the following composition: Iron, 54.01 per cent.; silica, 6 per cent.; phosphorus, 0.03 per cent.

## Trade Gossip

**Reduction Made.**—A reduction of 15 cents an hour will be effected in the wages of Winnipeg bridge and structural iron workers as a result of the decision of the Joint Council of Industry, presented to officials of the union. The previous wage agreement called for \$1.25 an hour. The men have agreed to abide by the ruling.

**Warns Them Away.**—Deploping the influx of men from other cities seeking work, Mayor Wilson, of Windsor, requested newspapers to assist in giving publicity to the scarcity of employment along the border. Scores of men from eastern Canadian cities, the Mayor said, are arriving there looking for work that does not exist.

**New Brokerage Firm.**—A new brokerage firm has been formed in Montreal by Graham Drinkwater under the name of Drinkwater & Co., and the seat of Oswald Bros. has been transferred to Mr. Drinkwater. The new broker is at present connected with Aldred & Co., and previous to that was vice-president of Canadian Fairbanks-Morse Co., Limited.

**Meet In Montreal.**—Probably the vastest aggregation of capital ever represented in Montreal will be gathered there June 7-9 next, when the American Iron and Steel Heavy Hardware Association will hold their twelfth annual convention there at the Windsor Hotel. It is expected that about 250 representatives of the leading iron and steel and hardware corporations of the United States will be present.

**Have Contracts.**—Messrs. Sir W. G. Armstrong, Whitworth & Co., Ltd., of London, England, have recently booked a contract for the construction of docks and the installation of the necessary machinery and plant in Nigeria. We understand the total amount of the contract is £3,500,000 sterling. They have also booked a contract for similar civil engineering work in Portuguese East Africa. The contract sum is approximately £1,500,000 sterling. These contracts will be carried out in their entirety by this English firm, who will manufacture and supply from their own works all requisite machine tools, dock gates, handling machinery, etc.



*"Finest on Earth"*

# ATKINS

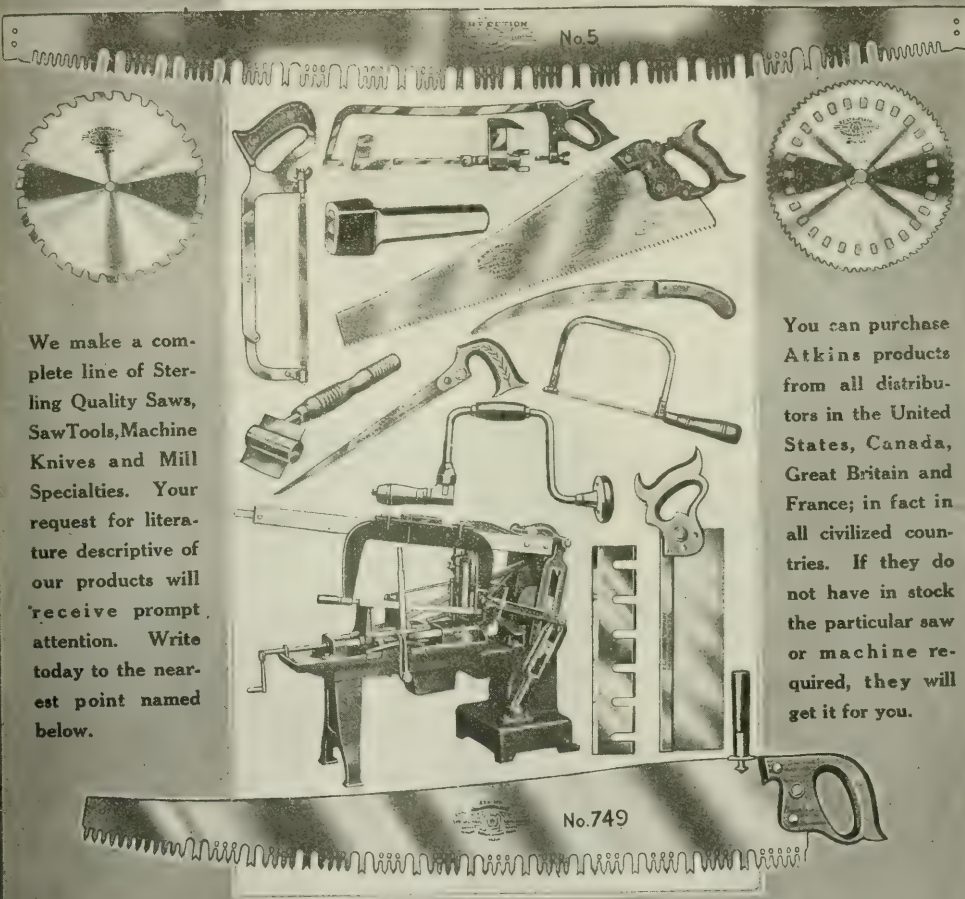
STERLING QUALITY

## SAWS and TOOLS

A Perfect Saw for every Purpose



*"Finest on Earth"*



We make a complete line of Sterling Quality Saws, Saw Tools, Machine Knives and Mill Specialties. Your request for literature descriptive of our products will receive prompt attention. Write today to the nearest point named below.

You can purchase Atkins products from all distributors in the United States, Canada, Great Britain and France; in fact in all civilized countries. If they do not have in stock the particular saw or machine required, they will get it for you.

*If you have difficulty in obtaining  
Atkins Saws and other products  
through your regular service, write*

## E. C. Atkins & Company

Established 1857

Canadian Factory: HAMILTON, ONTARIO

Branch: VANCOUVER, B. C.



## GOOD PACKING DOES MUCH TO CUT DOWN LOSS FROM STEALING

THE current journal of the Huddersfield (England) Chamber of Commerce contains an article on pilferage and packing, in which attention is drawn to the systematic thieving in connection with goods in transit, and the question is raised as to what extent packers are responsible. "It is safe to say that if all goods, at all times, were as much at the mercy of thieves as are 'goods in transit' the business world would have to put up its shutters because it could not carry on." While losses are directly due to thieves, it is suggested that it is nevertheless a fact that very often "the sight of means to do ill deeds makes ill deeds done," and one fault of present-day shipping practice is that it affords many opportunities to "make a thief." The object of packing is not merely for protection against damage, but for security against theft, and the important bearing of bad packing not only upon the loss of goods by theft but also upon the settlement of claims for such losses is largely overlooked.

### Some Examples of Faulty Packing

While there are many examples of faulty packing that help the thief and free the various authorities from responsibility, they are roughly divided, the Journal states, into a few leading types:

One of the most common faults in packing is the use of second-hand cases, which are, of course, comparatively easy to open without detection. The result is that, as officers cannot judge by appearance as to whether goods have been taken out before the cases reached the ship, they are obliged to give a "re-packed" receipt, which means that no claim will be paid by the ship for loss or damage by thieves.

Another common fault is the use of new cases with weak lids, protected, it may be, by extra battens around the edge, but the nails of which are driven straight down without clinching, with the result that the top boards drop and the nails "draw."

Cases otherwise satisfactory but not bound with hoop-iron are also frequently used, and are often quite unable to meet the ordinary inside and outside strains. The nails become sprung with a few handlings on train and wharf, and the goods are exposed by their own weight. For these cases, which offer a distinct temptation to the pilferer, the ship will only sign an "insufficiently packed" receipt, which prevents any claim for theft.

Other cases are bound with soft hoop-iron, which actually breaks in handling on and off the freight cars and before the ship is reached. Cases with openings similar to crates in which hooks can

easily be inserted, and cases so frail as to be unfit for ordinary handling are other familiar examples of packing which not only throws the loss but most of the blame for pilferage upon the shipper themselves.

The Journal offers several practical suggestions for remedying the evil:

1. Don't use second-hand cases unless they are strong and good and unless they contain articles not likely to attract thieves.
2. See that all cases have good ends and that all nails are properly clinched.
3. Bind all cases with strong hoop-iron at ends and also around middle.
4. Don't use frail cases.
5. Use only hoop-iron that will stand the strain of ordinary rough handling. "Scrap" all old soft hoop-iron.

Mr. McFadden, of the Diamond State Fibre Company, of Toronto, who has been confined to the hospital at Port Hope several weeks with pleurisy, has fully recovered and is taking up his duties again.

## RAILROAD WAGES CUT ABOUT JULY 1

Work of unskilled railroad workers will be cut July 1, according to a decision made by the United States railroad labor board, which has been conducting hearings in Chicago since the early part of April. The amount of the reduction was not stated in the decision, but will be announced on June 1. Practically every railroad in the country will be affected by the ruling, the total number of unskilled employees approximating 1,000,000 men. The decision came somewhat earlier than was expected, no ruling having been expected for several weeks. At the same time the board announced that on June 6 it would open hearings to receive proposals from the railroads relative to wage decreases for the skilled class of workers, and that the decision reached also would be made effective on July 1. With skilled labor receiving a cut, practically every class of railway workers would be affected, the total number of men employed by the roads being about 2,000,000. The last wage decision of the board was made on July 20, 1920, and increased the pay of all classes of workers about 21 per cent. or \$600,000,000 a year.

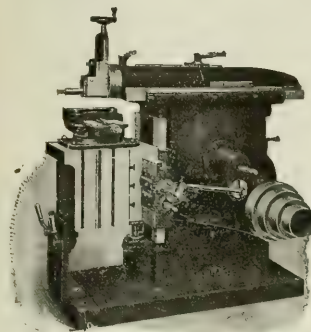


Don't stop, you're almost out of the woods.

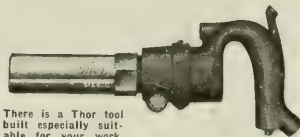
—Chapin in St. Louis "Star."

# GARLOCK WALKER

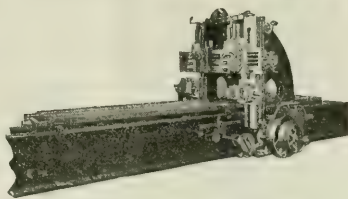
## HIGH GRADE MACHINE TOOLS



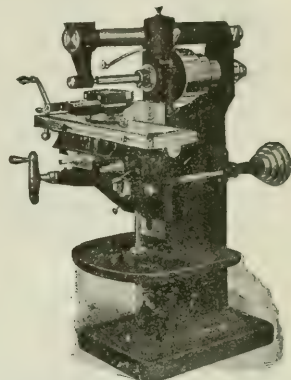
Shapers of various sizes, with single pulley or cone drive, both new and used, in stock for immediate shipment.



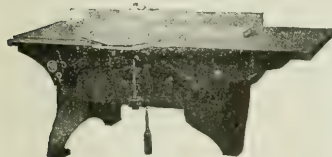
There is a Thor tool built especially suitable for your work.



Planers, several used for immediate shipment. Standard and openside machines for good delivery.



Small Milling Machines for your light work will save you money. Get our quotations.

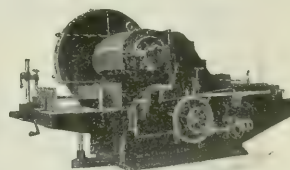


Hand Feed Jointer for your pattern shop. Sizes in stock 12" to 24".

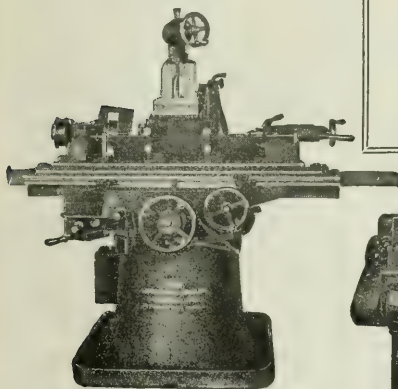
### New or Used Tools for Every Shop

**T**HE Garlock-Walker line of machine tools is inclusive. It embraces machinery for every metal and woodworking operation.

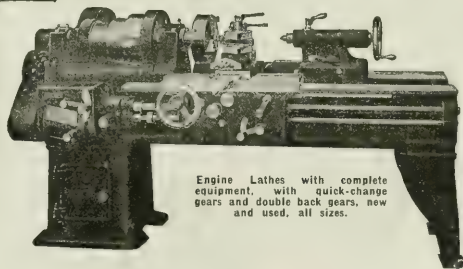
No matter what the size of your shop or what the equipment you need, your every requirement will be satisfactorily filled by Garlock-Walker.



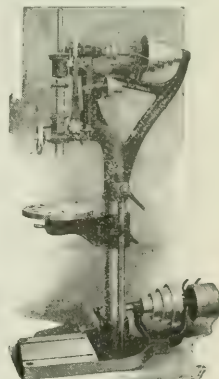
Ryerson Friction Saws for rapid cutting of steel shapes of all sizes. One No. 3, new, available at Toronto warehouse.



Bath Universal Grinders will do your cylindrical, internal, surface, disc and tool and cutter grinding. Write us about your grinder requirements.



Engine Lathes with complete equipment, with quick-change gears and double back gears, new and used, all sizes.



Many Silver, Champion, Rockwell and other back geared drills for your selection.



## Garlock-Walker Machinery Co., Ltd.

32 Front St. W., TORONTO

MONTREAL

WINNIPEG



## Upon the Health of your employees depend your profit and production



Don't be contented with half way solutions or makeshift drinking arrangements.

### Throw out the germ-laden Drinking Cup!

Give your men a clean drink

## **PURO** SANITARY DRINKING FOUNTAIN (MADE IN CANADA)



Allows just the proper amount of cool, clear, fresh water to come through the bubbler. No spouting, overflowing, no loss. "Puro" regulates itself "Puro" saves 1/2 on water bills, too. You attach it in a few minutes. Tell us how many men, how many departments and we'll tell you how much the cost will be.

### Puro Sanitary Drinking Fountain Co.

Canadian Agents:

### McKENZIE BROS.

888F St. Andre St., Montreal, P.Q.

## **WIRE SPRINGS** OF ALL KINDS

Machine Springs, Valve Springs, Automobile  
Cushion Springs, etc., of a quality that defies  
competition. Tell us your requirements. Send  
sample or specification for price.

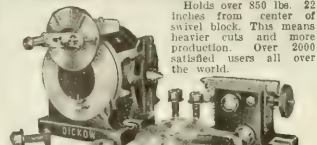
### JAMES STEEL, LIMITED

GUELPH, ONTARIO

The advertiser would  
like to know where you  
saw his ad.—tell him.

## Why Reduce Your Production

and waste money by using cheap, inaccurate Index Centers when a few dollars more will buy a DICKOW INDEX CENTER, which is absolutely dependable, and guaranteed for its high degree of accuracy.



PROMPT  
DELIVERY

Stood the  
test for  
14 years.

Also Manufacturers of "DICKOW  
SUPERIOR EIGHT" Precision Lathes  
Dependable and Accurate.

Write us to-day for complete description.

FRED. C. DICKOW MACHINERY  
CO., Not Inc., 3504 W. Lake St., CHICAGO, ILL.



## BOLTS AND RIVETS

We are equipped  
to fill the re-  
quirements of the  
Marine trade  
promptly. Square  
head, hexagon  
head and all kinds  
of Machine, Deck,  
Carriage Bolts  
and Rivets.

QUALITY PRODUCTS

### LONDON BOLT & HINGE WORKS LONDON, CANADA



No. 4 Press  
10 to 12  
tons

Write for complete information on  
Atlas Arbor Presses. All sizes for all  
purposes.

### ATLAS PRESS CO.

330 N. Park St.

Kalamazoo, Mich., U.S.A.

Canadian Representatives:  
Chas. A. Strelinger Co., Windsor, Ont.

## MASSEY-HARRIS CO. STUDIES NEW MARKET

### Shows Example of Good Export Trade Policy By Studying Conditions

An example of how Canadian firms should enter the export market is provided in the policy of the Massey-Harris Company in extending their field of operations. For a number of years the company has been successfully marketing a combination reaper-binder in Australia and South America. When, however, Spain, Algeria and South Africa were considered, certain changes and improvements on the machine were effected in order to make it more thoroughly suitable to the type of farming and class of people found in these new markets. A number of machines were next shipped over and complete tests and study of the situation instituted. It may safely be said that if mechanical harvesting equipment is saleable at all in these countries, the Massey-Harris Company will secure its fair share of business by these methods.

The case is but a repetition of the advice which men experienced in export problems have always given. The market is available for those firms who will by first-hand investigation find out the local conditions of trade and the particular fancies or needs of the people.

## Trade Gossip

**Want Machines Made.**—An American firm, making a well-known line of vibrators, state they would be pleased to get in touch with any firm in Canada that has the facilities for making their vibrators. The address of this firm can be secured from Canadian Machinery.

**Want Equipment.**—The McIlroy Belt-Int. Works, of Kingsville, Ont., want to buy second-hand calendar rolls, 8 by 12 inches in diameter and 36 by 40 inches long, slow geared. These gears are used for squeezing surplus compound back into the tank after belts are passed through.

**Want Dies Made.**—The Canadian Edison Appliance Co., Ltd., of Stratford, Ont., will have in the vicinity of \$30,000 worth of die work to give out during this year and are anxious to get in touch with outside firms who could handle this sort of work to advantage. They are manufacturers of the Edison, Hotpoint and Hughes lines of electrical goods. E. D. Fuller, of the above firm, reports that the Hotpoint Iron Week has been a big success. Their plant has been running 24 hours a day for the past month, and the chief trouble has been in the securing of raw materials.

## AUTOMOBILE MARKET

### Studebaker Sales Show 157 Per Cent. Increase For First Four Months

That the buying of motor cars in Canada is on the upward trend is evidenced by the statement of the Studebaker Corporation of Canada, Ltd., who report that their sales for the first four months of this year show an increase of 157 per cent. over the corresponding period last year. They further report that their factories at Walkerville, Ont., have been into full production since the first of April.

## Personals

J. E. Davies, president of the Alberta Foundry and Machine Company, Ltd., Medicine Hat, has been appointed president of the Lethbridge Iron Works Co., Ltd., succeeding C. A. Magrath. Mr. Magrath will continue with the firm as vice-president. V. W. Parrish, who is secretary of the Alberta Foundry and Machine Company, is the new secretary-treasurer of the Lethbridge Iron Works Company.

At the recent meeting of the Electric Club of Toronto, Mr. Frank Kennedy was elected president, succeeding Mr. Geo. D. Perry.

## PATENTS ATTORNEYS

**PATENTS**

Fetherstonhaugh & Co.,  
The old established firm. Patents everywhere. Head office Royal Bank Bldg., Toronto. Ottawa office, 5 Elgin St. Offices throughout Canada. Booklet Free.

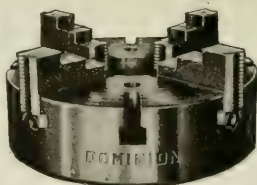
## Paper Mill Machinery

**BERTRAMS LIMITED**  
SCIENNES EDINBURGH

## OVENS

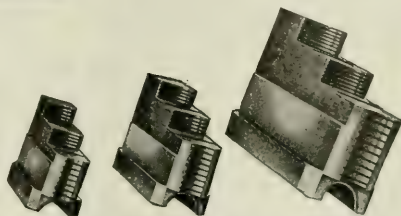
Japanning and Varnishing Ovens heated by Gas, Electricity, Steam or Coal. Kerosene Siphonage Ventilators, Bakers' Ovens, trucks, casters, etc. Write for Booklet.

**Brantford Oven & Rack Co. Ltd.**  
Brantford, Canada



## DOMINION CHUCKS

STEEL OR CAST-IRON BODY  
BUILT FOR HEAVY DUTY



## The Jaws Are Extra Strong

**THEY** are drop forgings, made of best quality steel, heat-treated and hardened. The threaded portion of jaws form a half nut for the setting-up screws. Have stood the test of heavy duty work in our own shops where accuracy was the only accepted standard.

**DOMINION STEEL PRODUCTS CO.  
LIMITED**

Engineers • Manufacturers

**BRANTFORD, CANADA**



## HAMILTON ENGINEERING SERVICE LIMITED

Consulting  
and  
Designing

Tools, Jigs, Fixtures and  
Special Machinery. Let  
us shoulder your pro-  
blems.

17 MAIN ST. EAST, HAMILTON

## DROP FORGE DIES

Send us your blueprints and specifications. Entrust your requirements to experienced workmen and up-to-date equipment. Have your dies made in Canada. First-class workmanship guaranteed.

**THE KIMBER & HILLIER MFG. CO.,**  
Thorold Road, - St. Catharines, Ont.



## Oil Tempered Steel Springs

—for every purpose  
and the best for each  
use.

Special styles of all  
kinds to Order.

**THE CLEVELAND  
WIRE SPRING  
COMPANY**

Cleveland, Ohio  
U.S.A.

## “Maple Leaf”

BRAND

Stitched Cotton Duck Belting

“Maple Leaf”  
brand costs less  
than leather, rub-  
ber and balata;  
has a positive  
grip on the pulley  
and is true run-  
ning.



Have us send you samples and see  
just why “Maple Leaf” sets the  
standard in economy, strength and  
durability.

**Dominion Belting Co. Ltd.**

Hamilton, Canada

Quebec Branch: 51 Duluth Bldg., Montreal

Your Wants are many here  
below. Use the Want Ad.  
page and get rid of a few  
of them.



# Classified Opportunities

## BUSINESS CHANCES

**WANTED—BY AN ESTABLISHED CONCERN.**  
Twelve to fifteen thousand dollars for a period of from one to three years, to take care of business expansion. This concern will stand the full investigation. 8% is offered with ample security to principals only, with an opportunity of becoming permanent associates with the partners, if mutually satisfied. Box 767, Canadian Machinery. (ctfm)

## MOTORS WANTED

**WANTED—ONE 10 H.P., 3-PHASE, 25-CYCLE,**  
220 volts, one 25 h.p., 3-phase, 25-cycle, 220 volts. Complete with low voltage release starter, base and pulley. Box 781J, Canadian Machinery.

## MACHINE WORK WANTED

**MACHINE WORK WANTED FOR LATHES,**  
shapers, milling machine and planer, etc. Hourly or contract basis. Prompt delivery. W. H. Sumbling Machinery Co., Toronto. (ctfm)

## MACHINE WORK WANTED

We are equipped to handle all kinds of general or special machine work. All operations in our plant are done under the most careful supervision and we can satisfy you as to price. Always available for consultation.

**PERFECT MACHINE COMPANY, GALT**  
Builders of Reliable Machinery.

Phone Park. 3550

**A. AUSTIN**

**GENERAL MACHINE WORK**

Turret Lathe and Automatic Screw Machine  
a Specialty. Let us quote on your work.

With: Garlock, Walker Machinery Co.  
163 Dufferin Street.

## PARTIAL LIST

### Machine Shop Equipment At Extremely Low Prices

**LATHES**—All sizes and lengths of bed.  
Special price quoted on rebuild  
20 in. x 8 ft. C.M.C.  
**AIR COMPRESSOR**—8 in. x 8 in. Chicago  
Pneumatic.  
**TANKS**—10 Tanks 10 ft. 6 in. diam. x 29  
ft. 6 in. long. 19,000 gals.  
3 Tanks, 10 ft. 0 in. diam. x 39 ft.  
0 in. long. 1/2 in. Heads. 22,893  
gals.  
Full line of other Steel Storage  
Tanks, open and closed, all sizes.  
**PUMPS**—1 Triplex Power Pump, 1 1/2 in.  
x 6 in. Hydraulic Machy. Co. Also  
1 in. x 5 in. West Tire Setter.  
1—Centrifugal Pump, 2 1/2 in. x  
1 1/2 in. Gould.  
1—Gould Triplex Power Pump, 2  
in. x 3 in.  
Milling Cutters and Reamers, full assort-  
ment, all sizes and shapes, at less  
than half price. Send us your  
enquiries.

### Standard Equipment & Tool Works

Dept. K. 307 St. James St.  
Main 2286 MONTREAL  
(20)

## MECHANICS WANTED

**WANTED — DRAFTSMEN HAVING EX-**  
perience on transformers and motors. Apply,  
stating qualifications and salary expected, to  
Canadian Crocker-Wheeler Co., Ltd., St. Catha-  
rines, Ont. (ctfm)

## Used Belting, Pulleys, Etc.

We carry right in stock a large quantity  
of used Belting, Pulleys, Hangers, Shaft-  
ing, etc., in good condition, which we sell  
at half the price of new. Inquiries solicited.  
In writing mention sizes wanted. L. S.  
Tarshis & Sons, 92 Wellington St., Mont-  
real.

## Modern Marine Machinery

Automatic Steam Towing Machines, Ship  
Windlasses, Cargo and Deck Winches,  
Steam Capstans, Dock Gypsies, Steering  
Engines, Hydraulic Freight Hoists, etc.  
Grey Iron and Brass Castings. Special  
machinery built to order. The Corbet Foundry  
& Machine Co., Limited, Owen Sound,  
Ont. (52)

## Grey Iron Castings

Light and Medium-Bench and Floor Repetition  
Castings: Capacity 15 tons per day.  
Expert Metal and Wood Pattern Work. Our  
advice and estimates will save you money.  
Semi-finishing operations on Lathe or Grill on  
Castings supplied if required.  
A.S.E. Co.

**THE KATIE FOUNDRY, GALT, ONT.**

## WANTED

Second-hand calender rolls  
8" to 12" in diameter, 36" or  
40" long, slow geared. These  
gears are used for squeezing  
surplus compound back into  
the tank after belts are  
passed through. Address,  
The McIlroy Belting Works  
of Canada, Limited, Kings-  
ville, Ont.

## REGO WELDING and CUTTING APPARATUS

Oxygen, Acetylene, and a  
complete line of Welding and  
Cutting Supplies.

**Carter Welding Co.**  
of Toronto, Limited

7-11 Sheppard St., Toronto, Ont.  
Phones: Adelaide 2841 and 1524  
(TF)

## PATTERNS

**TORONTO PATTERN WORKS, 65 JARVIS**  
Street, Toronto. Patterns in wood and metal  
for all kinds of machinery. (ctfm)

**BRANTFORD PATTERN WORKS ARE PRE-**  
pared to make up patterns of any kind—in-  
cluding marine works—to sketches, blue prints or  
sample castings. Prompt, efficient service. Bell  
Phone 681; Machine Phone 738. Brantford Pat-  
tern Works, 49 George St., Brantford, Ont. (ctfm)

## FOR SALE

**ELECTRIC STORAGE BATTERY LOCOMO-**  
tives for sale. Two. 36-inch gauge. Com-  
plete and in good condition. R. T. Gilman &  
Company, Dept. "E," 211 McGill Street, Montreal.  
(ctfm)

**MOTORS FOR SALE — 5 H.P. CAN. GEN.**  
Electric, 2-phase, 60-cycle, 1800 r.p.m., switch  
starter; 20 h.p., Fairbanks-Morse, 2-phase, 60-  
cycle, 1200 r.p.m., Auto starter (without low  
voltage release); 25 h.p., Can. Gen. Electric, 2-  
phase, 60-cycle, 1000 r.p.m., no starter; 30 h.p.,  
Westinghouse, 2-phase, 60-cycle, 945 r.p.m., Auto  
starter (without low voltage release); 3 h.p.,  
Westinghouse, 2-phase, 60 cycle, 1700 r.p.m.,  
switch starter; 1 Smart-Turner Triplex Belt-  
driven Pump, 2 x 3. Box 780J, Canadian Mach-  
inery.

## Used Machinery For Sale

- 1—No 1 Greenard Arbor Press and Stand
- 1—Small Drill Grinder
- 1—No 190 Wells Tool and Cutter Grinder
- 1—No 190 Heald Rotary Surface Grinder
- 1—No 70 Heald Internal Grinder
- 1—16" x 8" Mueller Lathe
- 1—Belt Driven Oil Separator

**CHARLES P. ARCHIBALD & CO.**  
285 Beaver Hall Hill MONTREAL

Machine Shop and Foundry for sale, St.  
Catharines, Ont. In the centre of the  
Welland Ship Canal and Hydro activities.  
Going concern capable of handling all  
classes of work. Turnover \$50,000 a year.  
Good reasons for selling. Box 777, Cana-  
dian Machinery. (c5m)

## SUNCLO BRAND

**WIPING CLOTHS  
COTTON WASTE  
WOOL WASTE**

Prepared By

**THE LEVI'S**  
98 John Street  
TORONTO, ONT.

Prices on application

# Classified Opportunities



## We have for sale the following Small Sized A.C. Generators 3 Phase, 60 Cycle

| K.W.   | Volt. | Make                 | R.P.M. |
|--------|-------|----------------------|--------|
| 15     | 2300  | Ft. Wayne            | 1800   |
| KVA 20 | 2300  | Fairbanks-Morse      | 1800   |
| 25     | 2300  | Ft. Wayne            | 1800   |
| 30     | 2400  | Westinghouse         | 1200   |
| KVA 30 | 2300  | Fairbanks-Morse      | 1200   |
| KVA 35 | 2300  | Allis-Chalmers       | 1200   |
| 37½    | 2300  | Westinghouse         | 1200   |
| 42     | 2300  | Electrical Machinery | 1200   |
| 45     | 1150  | General Electric     | 1200   |
| 50     | 550   | Crocker-Wheeler      | 1200   |
| 50     | 2300  | Fairbanks-Morse      | 300    |
| 50     | 2300  | General Electric     | 900    |
| 60     | 2200  | Warren               | 600    |
| KVA 60 | 2300  | Electrical Machinery | 900    |

## MacGOVERN & COMPANY, INC.

285 BEAVER HALL HILL, MONTREAL

Offices: New York, Pittsburgh, Seattle.

Plant: Linden, N.J.

Buyers and Sellers of New and Used Machinery

## A Sacrifice

6 ft. used Bertram Plain Radial Drill with Speed Box.

42 x 36 x 44 ft. used Bertram Planer arranged for Motor Drive.

24 x 14 x 20 ft. C.M.C. used Gap Lathe.

**Machines in first-class condition, at greatly reduced prices, subject to prior sale.**



## Williams & Wilson Ltd.

84 Inspector Street  
MONTREAL

## WAITING For What? LOWER PRICES

If you are just stop and figure out what it is costing you in efficiency and overhead.

### THEN

Join the wise ones and take advantage of this

### EXCEPTIONAL OFFER

2—26" x 12' C.M.C.'s, 3-step cone, D.B.G., Q.C.G., complete with all equipment and in first-class operating condition.

1—No. 4 Greenard Arbor Press, practically new.

1—No. 9 Badger State Hendey Whitmore Double End Punch and Shear, 1½" in 1½", first-class condition.

1—Smart & Turner 2-ton Hand Travelling Crane, 24' span, a bargain for quick disposal.

1—24" Bertram Shaper, rebuilt and equal to new.

1—No. 2 Garvin Universal Manufacturing Miller, complete with dividing head and equal to new.

A complete line of metal and woodworking machinery for immediate delivery. We are open to either buy, sell or exchange all kinds of spare equipment.

We are satisfying others, PERHAPS we can satisfy you.

Send lists of your requirements, together with list of spare equipment which you have for disposal. We can quote either new or used machines to meet all requirements at to-day's value.

## R. S. HOLLY

Suite 502

Kent Building

TORONTO, ONTARIO

Phone Adel. 3147

## STOCK SHIPMENTS Auto Body Steel

Deep Drawing Crown Fender Stock—  
Deoxidized—Oiled.

10,200 lbs., 23 Ga., 30" x 96" Primes

5,785 lbs., 23 Ga., 30" x 96" Seconds

Deep Drawing Hood and Fender Stock—  
Oiled.

8,265 lbs., 22 Ga., 30" x 96" Primes

1,435 lbs., 22 Ga., 30" x 96" Seconds

Regular Auto Body Stock—Oiled.

20,765 lbs., 20 Ga., 30" x 96" Primes

6,935 lbs., 20 Ga., 30" x 96" Seconds

3,220 lbs., 18 Ga., 39" x 96" Primes

Cold-Rolled Strip Steel and Bars.

Sheets—Black, Galvanized, Brass, Copper  
Aluminum.

Tubing—Welded and Seamless Steel, Brass,  
Copper, Flexible Steel Steam Hose.

Your enquiries are solicited.

## Ontario Metal Products Co. Limited

237 Dufferin St. - Toronto, Canada



# THE MACHINE YOU WANT AT A LOW PRICE

## VERTICAL BORING MILLS

- 2-30" London Machine Tool.
- 1-42" Bullard.

## HORIZONTAL BORING MILLS

- 1-4" Bar Beaman & Smith Floor Type.
- 2-4" Bar Bertram Elevating Table.
- 1-8" Bar Barrett Cylinder Boring.
- 1-8" x 7' Canada Fdy. Co. Boring Bar.

## BOLT AND NUT MACHINERY

- 1-2 Spindle Nut Tapper, ½".
- 1-½ to 2" Bolt Cutter.
- 1-¾" National Nut Forging Machine.
- 1-1½" Acme Bolt Header and Forging Machine.
- 1-4 Spindle Bertram Nut Tapper.
- 1-Blake & Johnson Thread Rolling Machine.
- 1-¾ x ½" Pawtucket Cold Nut Press.

## BLOWERS

- 1-No. 4 Roots Pressure Blower.
- 2-57 Cubic Ft. Connersville Blowers.
- 1-No. 10 Canada Blower & Forge Co. Blower.

- 1-No. 6 Sturtevant Blower.

## DRILLING MACHINES

- 1-12" Perfect Sensitive.
- 1-14" Excelsior Sensitive.
- 1-0 to ¾" Capacity, National Sensitive.
- 1-20" Prentice, Geared Drill, Plain Lever Feed.
- 1-20" Bertram, Sliding Head, B.G., P.F.
- 1-25" Barnes, Stationary Head, B.G., P.F.
- 2-20" Style F Baker.
- 1-3" Gang Radial.
- 1-5" Western Radial.
- 1-6" Western Radial.
- 1-5" Bickford Full Universal Radial.
- 1-4" London Semi-Universal Radial.
- 1-12" MacGregor-Gourlay Plate Radial.
- 1-3" MacGregor-Gourlay Wall Radial.
- 1-6" Spindle Crosby Mud Ring Drill.
- 1-13" MacGregor-Gourlay Radial and Countersinking.

## GRINDERS

- 18-Miscellaneous Pedestal Emery Grinders. Bench, floor and wet, 8 to 20" wheel capacity.
- 1-8" Goddard Piston Ring Grinder Magnetic Table.
- 1-40" Can. Fdy. Co. Piston Ring Grinder.
- 1-12" Pendrith Swing Arm.
- 1-Gisholt Tool Grinder.
- 1-Walker Universal Tool & Cutter Grinder.

## LATHE

- 1-Brown & Sharpe Bench Lathe.
- 1-12" x 5' W. P. Davis.
- 2-14" x 5' Bertram.
- 1-14" x 6' Monarch.
- 2-14" x 6' Porter.
- 1-15" x 8' Le Blond.
- 2-16" x 6' Canedy-Otto.
- 1-16" x 6' MacGregor-Gourlay.
- 1-16" x 6' F. E. Reed.
- 1-16" x 6' Le Blond.
- 1-16" x 8' Cleveland.
- 1-16" x 8' Lodge & Shipley.
- 1-18" x 6' Cincinnati.
- 1-18" x 12' Porter.
- 1-18" x 12' Bertram.
- 1-18" x 8' Bertram.
- 1-18" x 10' Stevens Hamilton.
- 1-20" x 8' MacGregor-Gourlay.
- 1-20" x 10' Bertram.
- 1-20" x 10' Canada Machy. Corporation.
- 1-20" x 10' MacGregor-Gourlay.
- 1-20" x 10' Boye & Emmes.
- 1-20" x 10' London.

- 1-20" x 10' Whitcomb Blaisdell.
- 1-22" x 8' Bertram.
- 1-24" x 10' Bertram.
- 1-24" x 12' London.
- 1-24" x 12' Schumacher & Boye.
- 1-24" x 20' Stevens-Hamilton.
- 1-26" x 12' Fitchburg.
- 1-26" x 16' Bertram.
- 1-26" x 18' Bullard.
- 1-28" x 10' Pond.
- 1-40" x 18' London.
- 1-20" x 34" x 10' London Gap.
- 1-18" London Fox Turret.
- 1-14" Bertram Fox Turret.
- 6-1½" Wood Tilted Turret.
- 3-No. 4 Bardons & Oliver Turrets.
- 3-1½" National Acme Turrets.
- 1-Pratt & Whitney Turret.
- 8-6A Potter & Johnson.
- 5-16" Bawden Single Purpose.
- 1-100" Bertram Locomotive Wheel.
- 1-Bertram Axle Turning.

## MILLING MACHINES

- 1-No. 00 Brown & Sharpe Bench.
- 1-No. 3 Hendey Universal.
- 1-No. 2 London Plain.
- 1-No. 13 Brainerd Universal.
- 1-No. 3 Bertram Plain.
- 1-Brown & Sharpe Plain.
- 1-24" Bertram Slab Miller Planer Type.
- 1-40" Bertram Slab.
- 1-42" Newton Vertical.
- 1-54" Newton Slab.

## METAL PLANERS

- 1-24" x 24" x 6' London.
- 1-30" x 30" x 10' London.
- 1-30" x 30" x 8' Bertram.
- 1-36" x 36" x 10' Bertram.
- 1-48" x 48" x 14' Stirk.
- 1-87" x 60" x 16' London.
- 1-106" x 84" x 28' Bertram.
- 1-40" x 40" x 10' Bertram.

## SHAPERS

- 1-14" Bertram Traverse, Double Table.
- 1-16" T. W. Hand Traverse.
- 1-16" Broadbent Traverse.
- 1-15" Smith & Mills Plain.
- 1-20" Hendey.
- 1-20" Bertram.
- 1-24" Morton Draw Cut.
- 1-30" Morton Draw Cut.

## STEEL PLATE MACHINERY

- 1-18" Niles Plate Planer.
- 1-40" Bertram Rotary Planer on Turn-table.
- 1-27" Allis-Chalmers Bending Rolls, capacity 1½" Plate.
- 1-9" 6" Bertram Straightening Rolls, capacity 1" Plate.
- 1-8" Smith Bros. Straightening Rolls, capacity 1" Plate.
- 1-7" Rushworth Straightening Rolls, capacity ½" Plate.

## PUNCHES AND SHEARS AND BENDERS

- 1-Cleveland Beam Punch and Coping Machine, 24" Beams.
- 1-Bertram double end, 32" throat, capacity 1" x 1".
- 1-Long & Alstatter Bending Machine, capacity 15" Beams and Channels.
- 1-Bertram Beam Coping Punch, capacity 24" Beams.
- 1 No. 2 Bertram, double end, 30" throat, capacity 1" x ¾".
- 1-Corbett, double end, 24" throat, capacity ½" x ½".
- 1-Long Alstatter, double end, 18" throat, capacity ¾" x 1".

- 1-Smith Bros., double end, 30" throat, capacity 1" x 1".
- 1-Canada Machy. Corp., single end, 30" throat, capacity 1" x 1".
- 1-Bertram Angle Shear, capacity 8" x 8".
- 1-Hilles & Jones Splitting Shears, capacity 1".
- 1-Pells T-40 Beam Shear, capacity 15" Beams and Channels.
- 1-Canada Machy. Corp., 60" Gate Shear, capacity 1".
- 1-Wangler Rotary Shear, capacity ¾".
- 1-No. 2 Cleveland Bending Machine, capacity 24" Beams.
- 1-Cleveland Horizontal Punch, capacity 1½" x 1".

## PRESSES

- 4-No. 666 Toledo Knuckle Joint.
- 5-No. 856 Toledo Rack and Pinion.
- 8-No. 857 Toledo Rack and Pinion.
- 2-No. 114 Toledo Semi-auto Reducing.
- 1-No. 45 Bliss, Straight Side, Gears.
- 1-No. 68N Bliss.
- 1-No. 57½ Toledo.
- 1-No. 166 Pawtucket.
- 1-No. 172 Pawtucket.
- 1-200-ton Pneumatic Forcing Press, 36 x 36 Platen.
- 1-Pneumatic Forging Press, 24 x 24" Platen.
- 2-Hand Screw Presses.
- 1-MacGregor-Gourlay Notching Press.
- 1-No. 4 Zeh & Hahnemann Notching Press.
- 1-Champion Scrap Busheling Press.

## WOODWORKING MACHINERY

- 1-12" J. A. Fay Jointer.
- 1-16" MacGregor-Gourlay Jointer.
- 1-32" Crescent Band Saw.
- 1-MacGregor-Gourlay Rip and Cross-Cut Saw Table.
- 1-24" Mc-G. Planer and Matcher.
- 1-Mc-G. "Daniels" Timber Planer.
- 1-54" Mc-G. Band Resaw.
- 1-Mc-G. Railway Cut-off Saw.
- 1-Mc-G. 12" 4-side Moulder.
- 1-Mc-G. 6" 3-side Moulder.
- 1-Mc-G. 2-spindle Shaper.
- 1-Mc-G. 5" Tenoner with Copes.
- 1-Mc-G. 20" x 14" Wood Lathe.
- 1-Mc-G. 48" 3-drum Sander.
- 1-Mc-G. 4" x 8" Door Clamps.
- 1-Mc-G. 42" 6" Sash Clamp.
- 1-Mc-G. Solid Spindle Mortiser.
- 1-Mc-G. Horizontal Boring Machine.
- 1-Jackson & Cochrane Horizontal Boring Machine.
- 1-No. 1 Beach Scroll Saw.
- 1-Covel Band Saw Stretcher.
- 1-No. 2 Oliver Wood Trimmer.

## MISCELLANEOUS

- 1-10" Crosby Slotting Machine.
- 1-24" Bertram Triple Head Locomotive Frame Slotter.
- 2-4" Pipe Machines.
- 1-2" Pipe Machine.
- 2-Coil Winding Lathes.
- 1-Coil Winding and Measuring Machine.
- 6-Bull Riveters, 9" to 42", Allan & Hanna.
- 8-6" Racine H.S. Hack Saws.
- 2-6" Marvel H.S. Hack Saws.
- 1-10" Racine H.S. Hack Saw.
- 1-Hand Bending Machine.
- 1-12" x 72" Grindstone with bearings.
- 2-3-ton Harrington Hoists.
- 1-2-ton Harrington Hoists.
- 1-2-ton Sprague Electric Hoist.
- 1-Single Friction Drum Cable Hoist.
- 1-Sand Mill.
- 1-No. 2 Garvin Tapping Machine.

*We Solicit your enquiries.*

**CANADIAN ALLIS-CHALMERS, LIMITED**  
King and Simcoe Sts., TORONTO, ONT.

*If what you need is not advertised, consult our Buyers' Directory and-write advertisers listed under proper heading.*

# We Are Selling Out Our Entire Plant

*Prospective Buyers of Various Equipment will find in our List some very attractive offers*

## LATHES

- 2—16" L. & S. Selective Head.
- 2—16" Reed-Prentice.
- 1—20" Reed-Prentice.
- 3—14" C.M.C. Lathes.
- 1—Bench Lathe.
- 1—24" L. & S. Lathe.
- 1—16" C.M.C. Lathe.
- 1—14" Amer. Tool Lathe.
- 1—24" Bridgeford.
- 1—Brightside Roll Turning Lathe.

## TURRET LATHE

- 1—3½" No. 2A Warner & Swasey.

## HACK SAWS

- 8—Racine Hack Saws.
- 4—Ed. Herbert Hack Saws.

## GRINDERS

- 1—Landis Universal.
- 1—Walker Double Stroke Surface.
- 1—Walker 10" Single Stroke.
- 1—Norton 10" x 50" Plain, No. 2178.
- 2—B. & S. No. 3 Cutter Grinders.
- 3—B. & S. No. 2 Cutter Grinders.
- 1—Wells No. 190.
- 1—Walker 8" Surface.
- 2—B. & S. No. 11 Plain.
- 2—B. & S. No. 10 Plain.
- 1—B. & S. No. 13 Surface.
- 2—Heald No. 70 Boring.
- 1—Rivet No. 3 Boring.
- 1—Landis 10" x 20".
- 1—Landis 12" x 42" Plain.
- 1—Valley City Duplex Tool.
- 1—Ford-Smith.
- 2—Holroyd Grind Relieving Machines.
- 2—Wilmarth & Mornen Drill Grinders.
- 1—Washburn Drill Grinder.

## MILLING MACHINES

- 1—No. 0 Reinecker Miller.
- 1—P. & W. Duplex Spindle Profiler.

## CENTERING MACHINES

- 1—Hendey.
- 2—Wells, No. 132.

## WOODWORKING MACHINERY

- 1—Circular Saw.
- 1—Band Saw.
- 1—Stamping Machine.

## AUTO SCREW MACHINES

- 1—¾" Cleveland Automatic.
- 1—1¼" Cleveland Automatic.
- 1—2" 6-spindle Cleveland Automatic.
- 1—1¼" 4-spindle Cleveland Automatic.
- 1—2¼" Gridley Automatic.
- 1—4¼" Gridley Automatic.
- 1—2" Cleveland Automatic.

## RELIEVING LATHES

- 1—Holroyd Universal.
- 1—2A Reinecker Universal.
- 1—Flather Plain.
- 4—A. W. Plain.

## DRILLS

- 1—J. Bertram Drill Press.
- 1—Avery Drill Press.
- 1—A. Herbert Single Spindle.

## FLUTING MACHINES

- 1—Holroyd ¼" to ½".
- 1—Holroyd ½" to 1".
- 1—A. W. 1½" to 2".
- 1—Holroyd 1" to 2".

## BOILERS

- 2—500 H.P. B. & W. Boilers.
- 2—500 H.P. G. & McC. Boilers.
- 2—250 H.P. G. & McC. Boilers.
- 1—100 H.P. G. & McC. Boilers.

## BORING MILLS

- 2—100" C.M.C. Boring Mills.
- 1—72" Stirk Boring Mill.
- 1—42" Bullard Boring Mill.

## PRESSES

- 1—Morgan Hydraulic Stamping Press.
- 1—Morgan 1,000-Ton Steam Hydraulic Press.
- 1—Morgan 2,000-Ton Steam Hydraulic Press.
- 1—Morgan 600-Ton Steam Hydraulic Press.
- 1—United Eng. 500-Ton Steam Press.
- 1—Morgan Centering Press.

## PUMPS

- 2—Smart - Turner Double Acting Boiler Feed Pumps.
- 1—Deane Hydraulic Pump.
- 1—Darling Bros. Vacuum Pump.
- 2—Can. Allis-Chalmers No. 3 Single Stage Turbine Pumps.

## ELECTRIC FURNACES

- 1—3-Ton Heroult Tilting Furnace.
- 2—6-Ton Heroult Tilting Furnaces.
- 1—6-Ton Heroult Rocking Furnace.

## ROLLING MILLS

- 1—9" Boonton Rolling Mill.
- 1—12" Lamberton Rolling Mill.

## JIB CRANES

- 6—2-Ton Jibs, complete with Air Hoists.

## STEAM ENGINES

- 1—1,000 H.P. C.C. Steam Engine.
- 1—350 H.P. Porter Allen Simple Steam Engine.
- 1—1,000 H.P. Tod Simple Steam Engine.
- 1—600 H.P. Goldie & McCulloch C.C. Steam Engine.

## CRANES

- 2—Lowground Charging Machines.
- 4—5-Ton Whiting Cranes, 48 ft. span.
- 1—15-Ton Whiting Crane, 72 ft. span.
- 1—15 Wellman, Seaver & Head, 72 ft. span.
- 1—5-Ton Whiting Crane, Hand Operated.
- 1—10-Ton Whiting Crane, Hand Operated.

## STEAM HAMMERS

- 1—Bertram, 3-ton.
- 1—Massey, 1-ton.
- 1—Massey, 12 cwt.
- 1—Massey, 8 cwt.
- 1—Massey, 4 cwt.

## SHEARS

- 1—Craig & Donald Shear.
- 1—Long & Alstatter Shear.
- 1—Hydraulic Shear.
- 1—Cleveland Shear.

## MISCELLANEOUS

- 1—Amer. Tool No. 2 Oil Separator.
- 2—Auto. Machine Co. Threading Lathes.
- 1—Hoefler Tap Threading Machine.
- 1—A. S. Thread Grinder.
- 1—Taylor & Hobson Etching Machine.
- 1—No. 4 Tilghman & Brockman Sandblast.
- 2—Ed. Herbert Hack Saws.
- 1—Bar Reeling Machine, 1¼" Rd. to 2¼" Rd.
- 1—Tyre Rolling Mill.
- 1—Wheel Rolling Mill.
- 1—600 H.P. Cochrane Leed Water Heater.
- 1—Hydraulic Accumulator, 1,500 lbs. pressure.
- 1—Bar Straightening Machine, ¼" to 1½".
- 9—Swing Grinders.
- 1—Crossey Coke Grinder.
- 1—Betts Horizontal Boring Mill.
- 1—Crossey 20" Pug Mill.
- 1—Crossey Crucible Pot Moulding Machine.
- 2—Champion Blacksmith Forges.
- 1—American Clay Co. Hot Top Machine.
- 1—American Clay Co., 7 ft. Wet Pan.
- 1—Newton Cold Saw.
- 6—10-Ton Ladles.
- 1—Tensile and Bending Testing Machine.
- 1—Brinell Testing Machine for Hardness.
- 1—Microscopic Photographic Bench.
- 1—Canadian Ingersoll Air Compressor, 732 cu. ft. per min.
- 1—Powdered Coal Plant, complete.
- 2—Bruce Peebles Motor Generator Sets, 350 K.W. each.
- 1—Swedish General Electric Steam Driven Generator, 375 K.W.

*Complete line of motors in various H. P. and Speeds.*

*Permission to view plant can be obtained at*

**Armstrong Whitworth of Canada, Limited**  
298 St. James Street, Montreal



## Let Us be Your Toolroom

We have one of the finest equipped  
shops for producing

**Tools, Dies, Fixtures, Gages  
and Special Machines**

## CONTRACT WORK

Our organization and equipment is at  
your service for the economical  
manufacturing of your  
product

*We solicit your enquiries*

**British Canadian Machine &  
Tool Co., Ltd.**

111 Adelaide St. West, TORONTO, CANADA

## MACHINERY FOR SALE

### Lathes

- 1—26" x 12' Pond Lathe, S.B.G., C.R., P.C.F.
- 1—24" x 12' New Haven Lathe, D.B.G., S-Q.C.G., C.R.
- 1—24" x 12' Can. Mach. Lathe, S.B.G., C.R., P.C.F.
- 2—22" x 10' Davis Lathes, D.B.G., Q.C.G., C.R.
- 1—22" x 10' Rahn-Larmon Lathe, S.B.G., S-Q.C.R., C.R.
- 1—21" x 10' London Lathe, S.B.G., C.R., P.C.F.
- 4—20" x 8' C.M.C. Lathes, D.B.G., S-Q.C.G., C.R.
- 3—18" x 8' C.M.C. Lathes, D.B.G., Q.C.G., C.R.
- 1—18" x 10' Butler Lathe, D.B.G., Q.C.G., C.R.
- 1—18" x 8' London Lathe, S-Q.C.G., D.B.G., C.R.
- 1—16" x 6' McDougall Lathe, S.B.G., S-Q.C.G., C.R.
- 1—18" x 8' Mueller Lathe, D.B.G., Q.C.G. Turret on cross  
slide.
- 1—14" x 6' Flather Lathe, S.B.G., Q.C.G., C.R.

### Shapers

- 1—16" Butler Shaper.
- 1—12" Port Hope Shaper.

### Drills

- 1—No. D-1 H.D. Colburn Drill.
- 2—No 24 H.D. Foote Burt Drills.
- 1—28" Barnes Drill, B.G., P.F.
- 1—22" Barnes Drill, B.G., P.F.
- 3—20" McDougall Drills, W. & L.F.

### Miscellaneous

- 2—2" x 26" Pratt & Whitney Turrets.
- 1—No. 2 Gardner Disc Grinder.
- 1—3" Acme Bolt Cutter.

## YEATES MACHINERY

HALE STREET  
LONDON, ONT.

# FORD-SMITH

## Secure our Estimates on Your Requirements in the Shape of SPECIAL MACHINERY DIES, JOBBING WORK, ETC.

Expert machinists of long experience only are employed in the construction  
of our special machines in addition to those employed on—

### OUR REGULAR LINES OF

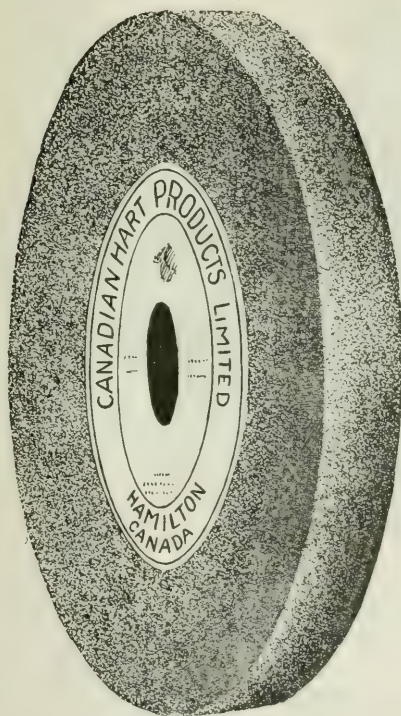
Milling Machines, Motor Driven and Belt Driven Grinders,  
Polishers, Disc Grinders, Swing Grinders.

*Our Engineering Staff is Ready to Advise You!*

**THE FORD-SMITH MACHINE CO., Limited**  
Hamilton, Ontario, Canada

# CANADIAN HART WHEELS

## *Vitrified — Silicate — Shellac*



**Canadian Hart Vitrified Wheels**—recommended for the majority of grinding jobs. May be used wet or dry; give better all-around satisfaction and have a longer life.

**Canadian Hart Silicate Wheels**—can be made in twenty-four hours and are often substituted when it is inconvenient to wait the required length of time for Vitrified Wheels.

**Canadian Hart Shellac or Elastic Wheels**—indispensable for slotting work where a thin wheel is required, or for work requiring a special finish. Can be operated wet or dry.

Tell us what you want to grind and we will tell you the wheel to use for the best results.

**Canadian Hart Products**  
LIMITED

**Hamilton**

-

**Ontario**

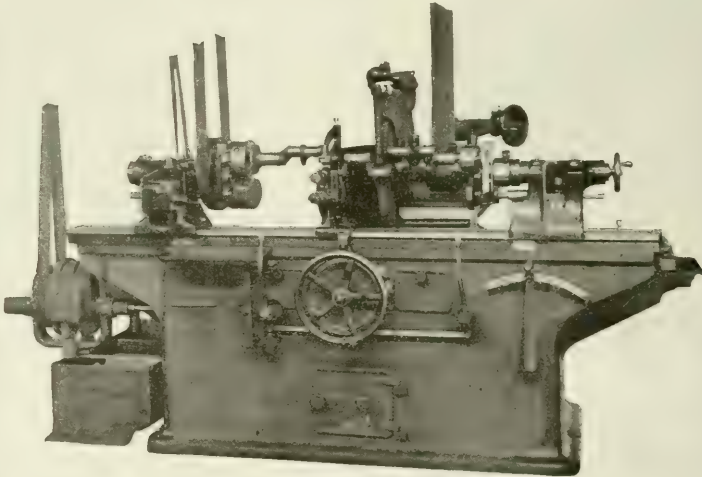


**Made in Canada**



## For Regrinding ALL Types of Crankshafts No. 4-A Special Grinding Machine

**LANDIS**



Why turn away the best jobs when you can handle them on a Landis 4A Special? This machine was designed especially for performing every operation necessary to put the gasoline motor in first-class condition.

Let us show you what this machine has done for others—it will do the same for you. Send for literature.

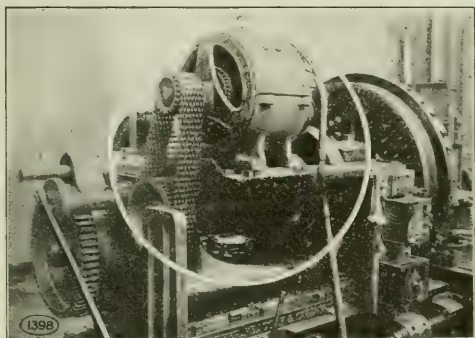
### Landis Tool Company, Waynesboro, Pa.

Canadian Agents: A. R. Williams Machinery Co., Toronto, Winnipeg, Vancouver.  
Williams & Wilson, Montreal.

# RENOLD

## DRIVING CHAINS

Reliable — Efficient — Durable — Compact

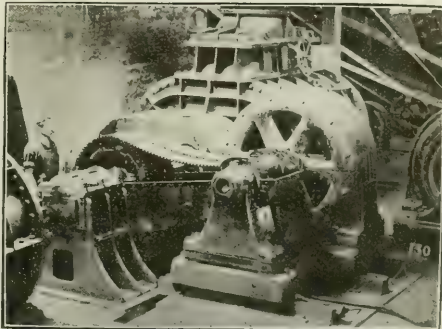


20 H.P. "RENOLD" SILENT CHAIN OPERATING 36-IN. LATHE

Have YOU any Power Transmission Problems, Noisy Gears, or Slipping Belts? If so, *write us*. Our Engineering Service is at your disposal.

*We carry large stocks of Silent and Roller Chains at Montreal. Quickest possible deliveries of complete Drives ensured.*

No Power too Small.  
No Power too Large.  
No Drive Impossible.  
Noiseless in Operation.  
Unaffected by Heat, Cold or Dampness.  
Short Centres—Positive Speed Ratios.  
Maximum Life and Durability.  
Efficiency 98.2%.



350 H.P. DOUBLE-STRAND RENOLD SILENT CHAIN DRIVE OPERATING ROOTS BLOWER.

(Note: Top half of Oil-Bath Chain Case removed)

THERE IS ONLY ONE "RENOLD" CHAIN

Sole Canadian Representatives:

## HANS RENOLD OF CANADA LIMITED

HEAD OFFICE  
11 St. Sacrament Street  
MONTREAL

BRANCH OFFICE  
32 Front Street West  
TORONTO



# PERFECT MACHINES

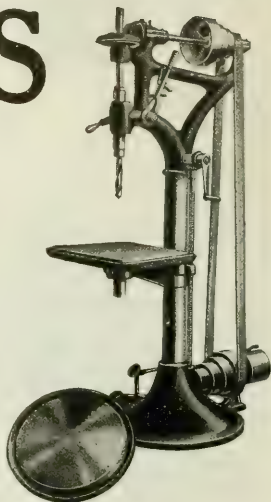


Perfect 12 in. and  
14 in. Screw Cut-  
ting Lathe With  
Gap

Furnished in 6' or  
8' lengths. Just the  
lathe for machine  
shops, experimental  
shops, technical  
schools, garages,  
etc. Nice conven-  
ient design, small  
consumption of  
power, and low  
price.

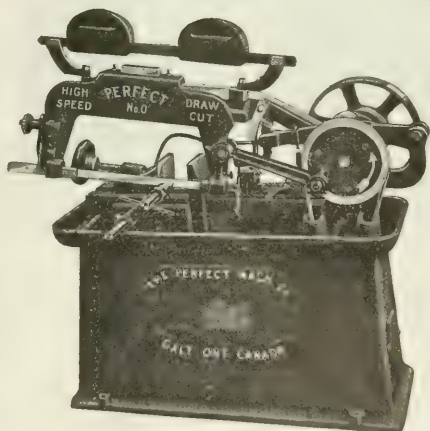
## Satisfy Your Require- ments from this array of Tested Machines

Every machine we  
feature here is  
thoroughly reliable  
and guaranteed to  
give satisfaction. We  
are proud of their  
"performance" re-  
cords. Every tool  
subjected to the most  
rigid tests before leav-  
ing our plant.



NO. 19 DRILL

Lots of power here. Handles  
a drill from 0 to 29/32.  
Geared 2 to 1, and driven  
by a 2-in. belt.



NO. 0 PERFECT HACK SAW

Look at this sturdy little worker. It's a  
High Speed tool and perfectly built. Capac-  
ity 0" to 6" or more on request. Speed 120  
R.P.M. Weight, 600 lbs.

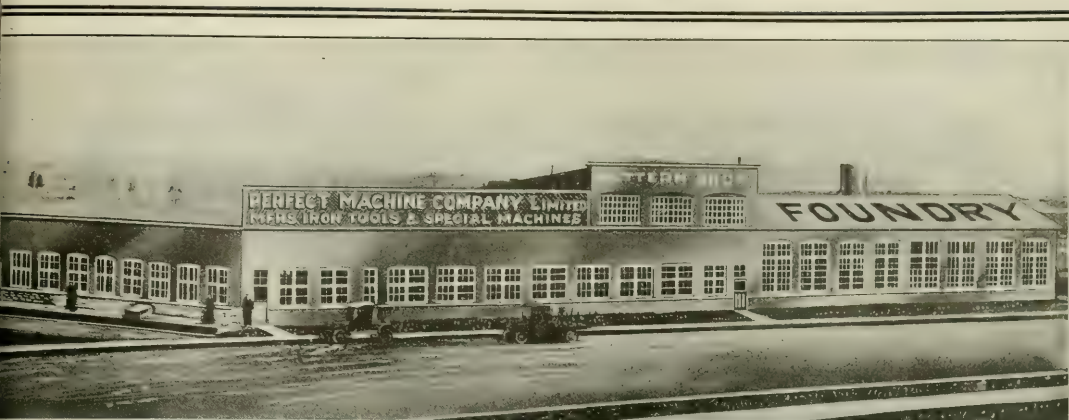


THE PERFECT 18-IN. LATHE.

You can tell there's strength, power and  
great rigidity in this Lathe. Capable of  
delivering the most accurate work at high  
speed. Quick change gear, double back  
gear—any length. You'll like this lathe—  
and you'll like the price.

# PERFECT GALT,

For Sale in Canada by All



## Perfect Machine Company, Limited, Galt, Ont., Canada

**T**HE Perfect Machine Co., Limited, manufacture a very high grade line of Iron Working Tools, consisting of Lathes for Tool Room, Machine Shop, or Garage; Drill Presses, Hack Saw Machines, Buffing Lathes, Grinding Machines, Drill, Shaper and Bench Vises, and special Machines of any kind.

We solicit Pattern and Model Making, and also make Grey Iron and Semi Steel Castings.

S. L. CLARK, President and Managing Director.

WESLEY CLARK, Vice-President.

R. M. RENWICK, Secretary-Treasurer.

Directors: JOHN S. RUMBLE.

WM. B. CALL.

Superintendent, GEO. J. CLARK.

## *Mr. Manufacturer:-*

**If you're not already located here, why not do *your* manufacturing in Canada?**

Arrangements could be made with us with this end in view that would be mutually advantageous.

We have an up-to-date Foundry, Pattern Shop, Machine Shop, and Mechanics second to none.

Can we not co-operate and manufacture your goods as well as our own?

*If You're Interested, Write*

# MACHINE CO., Limited

## ONTARIO

Leading Machinery Houses

*Represented in Great Britain by*

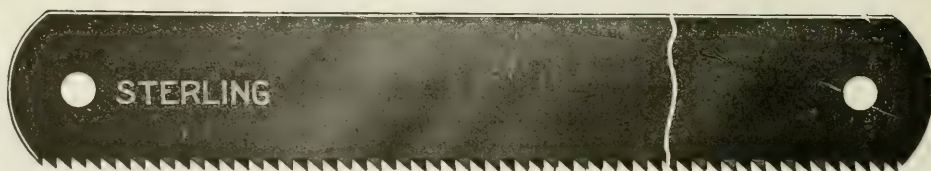
**FRY'S (London) Limited**



HACK

"STERLING"

SAWS



MANUFACTURED BY  
DIAMOND SAW & STAMPING WORKS

--:-

BUFFALO, N.Y., U.S.A.

# EMPIRE

## TOOLS, DIES, JIGS AND FIXTURES

are made with the idea of increasing the *quality* and *quantity* of your product. Our production department can do your manufacturing in a manner pleasing and *profitable* to you.

Send us your Enquiries and Blue Prints.

## EMPIRE TOOL WORKS

100 King St. W.  
Adelaide 5274  
TORONTO, ONT.

## Don't Keep It--Sell It!

If you have a lathe  
a drill  
a milling machine  
a planer  
a chain block  
a chuck  
a motor  
a crane  
a stock of belting  
an engine  
a compressor

or any other machine shop equipment for which you really have no further use, why not turn it into *cash*?

Someone may be looking for just the machine you may want to sell. Let us bring you together.

A "classified" ad. in CANADIAN MACHINERY, costing a few cents per issue, has done wonders for others. Why not try it?

Turn to the "Classified" section in this issue and see what is being offered and what is wanted at present.

## CANADIAN MACHINERY

*Classified Advertising Section*

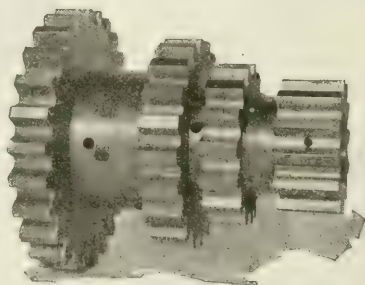
143-153 University Avenue TORONTO, ONT.

THIS IS TO CERTIFY THAT  
Canadian Machinery and Manufacturing News

HAS SUBSCRIBED TO THE STANDARDS  
OF PRACTICE AND IS ENTITLED TO THE  
PRIVILEGES AND BENEFITS OF MEMBERSHIP IN

THE ASSOCIATED  
BUSINESS PAPERS, INC.

*James H. Hall*



**Good  
Gears**

**Hamilton Gear & Machine Company**  
Van Horne Street, TORONTO

*If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.*

## United States Electric Drills and Grinders

### The "BUZ"



For all kinds of general drilling in metal up to 5/16"—name plates, cotter pin holes, oil holes, etc.

The "BUZ" is especially adapted to corner drilling—drills within 1/4" of corner. Switch is located in handle; under absolute control at all times. Attaches to any lamp socket, alternating or direct current, 110 or 220 volts. Guaranteed the most powerful electric drill of its weight on the market.

Order a few to-day for trial. Their time and labor saving ability will convince you you need more!

For Sale By

**The Canadian Fairbanks-Morse Co., Limited**

Montreal, St. John, N.B., Toronto, Winnipeg, Calgary, Vancouver

**THE UNITED STATES ELECTRICAL TOOL CO.**  
CINCINNATI, OHIO

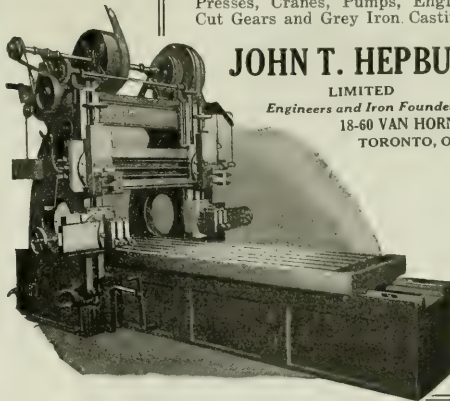
This is a Canadian - Made Planer. Standard size 42" x 42" x 10' 0". For general dependability use a Hepburn. It pays.

## HEPBURN HIGH-SPEED PLANER

The material in this Hepburn Planer is of the best, and the workmanship equal to any other. Thus long service is assured.

Two or four heads supplied as required. The rack is of cast steel and the pinions are made solid with the shafts. Write for specifications.

We also manufacture Power Presses, Cranes, Pumps, Engines, Cut Gears and Grey Iron Castings.



**JOHN T. HEPBURN**

LIMITED

Engineers and Iron Founders

18-60 VAN HORNE ST.  
TORONTO, ONT.

## Do You Read These Advertisements?

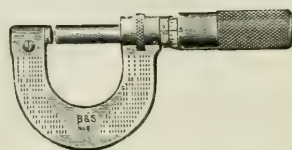
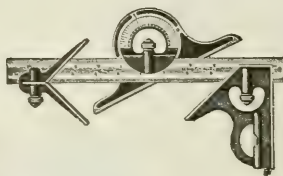
Every advertisement in this magazine is worth reading. It is the product of some concern that is using a modern method of making sales, viz., technical paper advertising, in order to present most effectively to you the leading features of its line.

These advertisers are making it easier for you to buy intelligently with the least waste of your time and theirs. They realize that a sales force cannot replace this service at equal cost. They know that advertising is good business, for the manufacturer who does not advertise cannot save the cost of advertising. Consistent advertisers are progressive merchandisers. They are saving your money and their own; and it pays to do business with them.

Don't miss your opportunities. These advertisements are interesting. Many are distinctly instructive, and a glance through them every month will keep you posted on the latest developments for machinery equipment.



# Construction, Factory, Foundry and Machine Shop Supplies



Bar Iron; Sheet Iron (black and galvanized); Mild Steel; Machine Steel; Cast Steel; High-speed Steel; Carbon Steel; Cold-rolled Steel.

Hack Saw Blades, Machine Screws, Set Screws, Cap Screws, Drills (Carbon and High-speed), Files, Starrett, Brown & Sharpe, and other Machinists' Tools, etc.

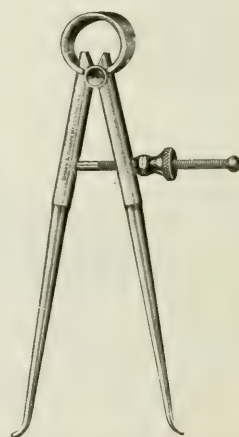
For seventy-three years our products have been well and favorably known to users of hardware and metal supplies throughout Canada. We handle only reliable lines and endeavor to render satisfactory service to all our customers.

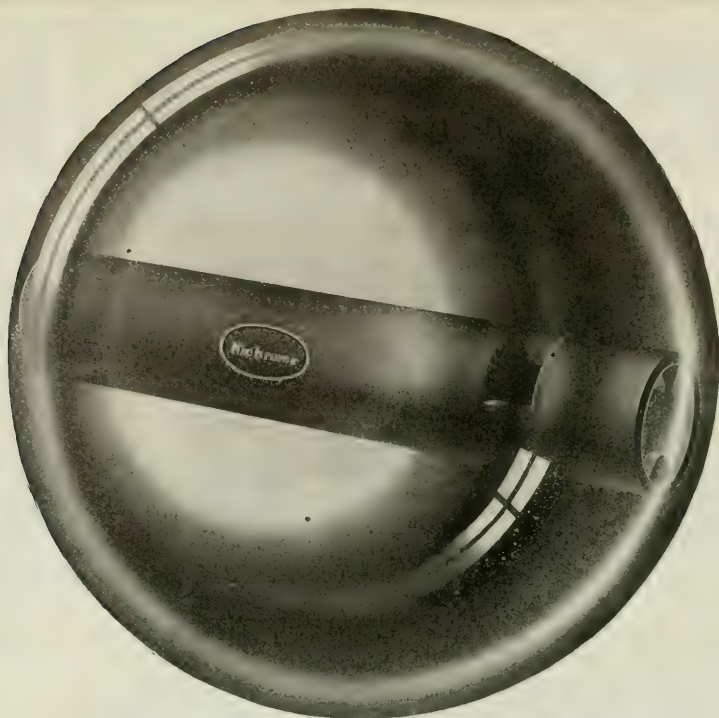
We shall be glad to quote prices and dates of delivery on such of our lines as interest you.

## RICE LEWIS & SON, Ltd.

*Established 1847*

19 VICTORIA STREET  
TORONTO





## A Big Thing in Ball Bearings

**E**VEN if ball bearing manufacturers considered case-hardening economy more important than the quality and uniformity and dependability of the case, Cast Nichrome Retorts and other styles of Nichrome Containers would still serve them to best advantage.

The economy that comes from less spoilage of expensive materials, of the shorter heats and less fuel consumption, is in addition to the economy that comes from the longer life of Cast Nichrome Containers. Thousands of furnace hours at 1800°F. are *guaranteed*.

*Manufactured under HENDERSON PATENTS*



Retorts of

CANADIAN DRIVER-HARRIS CO.  
WALKERVILLE, ONT.

Chicago - Detroit

American Office and Works  
Harrison, N. J.

England - France

# Cast Nichrome

ENDURE IN HIGH TEMPERATURE

*If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.*



## Let's Be Reasonable

Does any reader of this page believe that **at this time** a re-adjustment of wages and hours in the printing industry involving an increase in labor costs of 36 per cent. is justified?

"Well," the reader asks, "What **are** present wages and hours?"

Toronto printers now have a minimum wage scale of \$35.20 per week for 48 hours. This is an increase of 10 per cent. over the scale called for in the agreement now expiring and was granted voluntarily by employers a year ago.

Their demands now are for a wage of \$44 per week for 44 hours.

This is an increase of \$8.80 per week for four hours less work.

It means an increase in labor costs of 36 per cent.

Toronto employing printers feel that they cannot grant these demands, and they believe that the general public will support them in their opposition to an increase of from 73c per hour to \$1.00 per hour to printers, pressmen, bookbinders, and mailers, **at the present time** and in view of business conditions **as they now exist**.

It is understood that International Union officials at Indianapolis have issued orders to local unions that the 44-hour week must be the basis of all new agreements.

In this order, employing printers believe that these Indianapolis officials are out of line with the need which is apparent in every industry for lower cost of production.

This is not a time for saddling any industry with an additional 36 per cent. labor cost, and publishers and job printers feel that they are justified—in the interest of the public—in resisting this unreasonable demand from Indianapolis.

The issue will be decided between now and June 1st. If the union demands of an increased wage of \$8.80 per week for 4 hours' less service are not withdrawn, a strike seems inevitable.

Pressure, therefore, must be brought to bear upon the officials at Indianapolis. They must be shown by members of the local union (many of whom feel that they are being forced to make unreasonable demands) that the Canadian public which buys the product of the printing craft, either in the form of advertising or subscription, does not look with favor upon any ruling which would add so heavily to the cost of that product.

Publishers and job printers in Toronto want to be fair. This is indicated by their action in voluntarily raising wages a year ago.

They must, however, in justice to themselves and the public they serve, resist these impossible demands.

## Let's Be Reasonable

An expression of opinion of readers of this paper on the Union's proposals, involving an increase of 36% in the labor cost of printed matter, is asked. Will you not write a letter (no for publication) telling him your view of the situation?

*This statement is published by and has received the endorsement of Toronto publishers who are members of the*

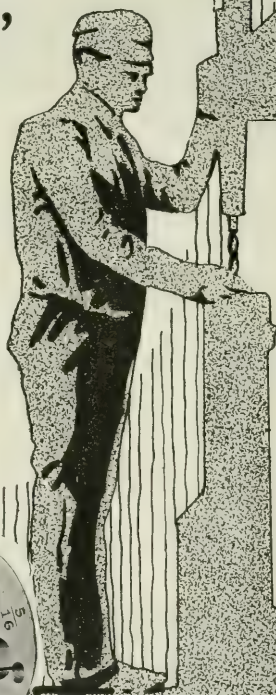
## Canadian National Newspapers and Periodicals Association

including Cdnadian Machinery

# BUTTERFIELD

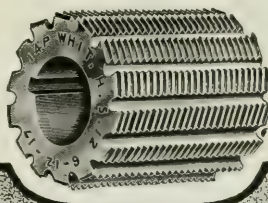
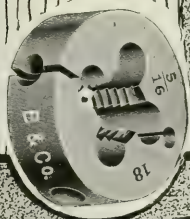
Drills,  
Reamers,  
Milling  
Cutters,  
Taps  
and  
Dies

THE  
TOOLS  
YOU  
BUY  
AGAIN



**M**ERIT in tools to-day is judged by their ability to do efficient work, save labor and expense. These are the factors the Butterfield engineers have aimed to impart to all Butterfield products. That Butterfield engineers have succeeded in their aim is proven by the ever increasing demand for Butterfield **TWIST DRILLS, REAMERS, MILLING CUTTERS, TAPS AND DIES.**

If you have not used Butterfield tools you must admit they are worth giving a trial.



**Butterfield & Company, Division**

**UNION TWIST DRILL CO.**

Rock Island, Que. - - - Canada

Stores:—220 King Street West, Toronto. 131 St. Paul Street West, Montreal.  
Agents:—D. Philip, 138 Portage Ave., Winnipeg, Man. The Triangle Co.,  
Standard Bank Bldgs., Vancouver, B.C.

**Foreign Representatives:** Great Britain, Geo. H. Alexander, 53-54 Colchall St., Birmingham, England. France, Italy, Belgium and Switzerland, Fenwick Freres, 8 Rue de Bercey, Paris. Sweden, Norway and Denmark, Ab. Sigt. Anderson & Co., Malmo, Spain, Casamiriana Hermanos, Barcelona. Japan, Abe-Kobel & Co., Yokohama. Greece, Stephen C. Stephenson, 11 Lycouratz St., Athens. Netherlands, Wymalen & Hausman, Rotterdam. Australia, H. R. Richardson, 82 Pitt St., Vickers' Chambers, Sydney. South America, Charles Dreyfus, B. Mitre 735, Buenos Aires. R.A.: South Africa, H. Parker Wood, Cape Town, Durban and Johannesburg.



# The Wallace Barnes Company



This Company is equipped to make a thousand-and-one Small Parts, threaded or unthreaded, and of "Barnes-Made"—meaning of *guaranteed*—accuracy.

In any metal, according to specifications or requirements—plain, case-hardened or any other finish.

Limits:  $1\frac{1}{4}$  inches in diameter.

*Let us quote on your requirements.*

THE WALLACE BARNES Co.

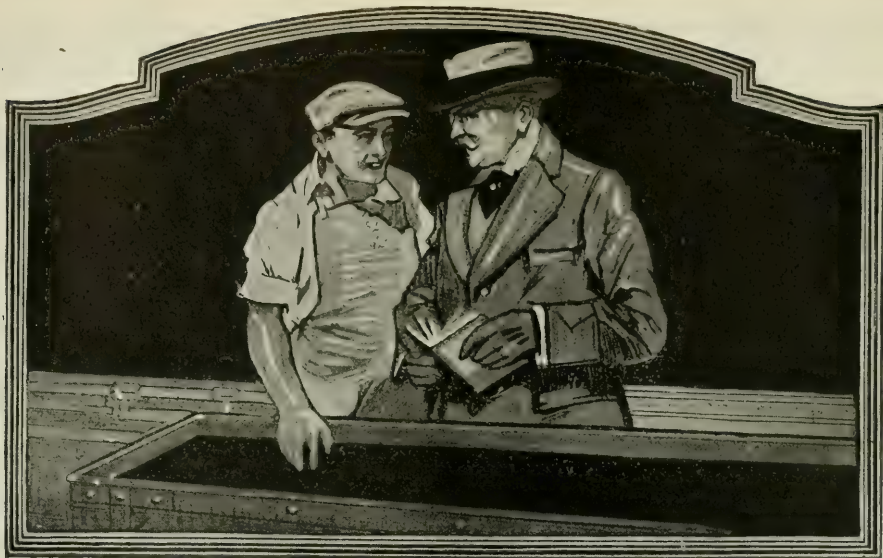
*"Spring Makers for Three Generations"*

Main Office and Works:  
Bristol, Conn.

Western Office:  
Book Bldg., Detroit:

"Barnes-made for every trade"





## Oakite Saves Over \$4,000 a Year On One Cleaning Operation



In a certain plant, small brass parts were washed with soda ash to remove rubber compound. Soda ash left a sediment, so 5 girls had to be employed to scrub the parts with soap to remove the sediment.

This operation was slow, tedious and costly.

An Oakite representative was given an opportunity to investigate cleaning conditions in this plant. The use of 30 lbs. of Oakite every week to replace 444 lbs. of soda ash was recommended and Oakite was adopted.

The parts now come from the tank absolutely clean. No sediment. No scrubbing.

Oakite has saved this plant \$83.52 weekly on one cleaning operation—or more than \$4,000 a year.

We have a representative in your territory. May we ask him to call at your plant and have him go over your cleaning requirements with you? This will take but a few minutes of your time, and you can find out just what it would involve to run a competitive test on your work. He can perhaps indicate just what results you can expect and offer suggestions as to methods and materials best suited to your work.

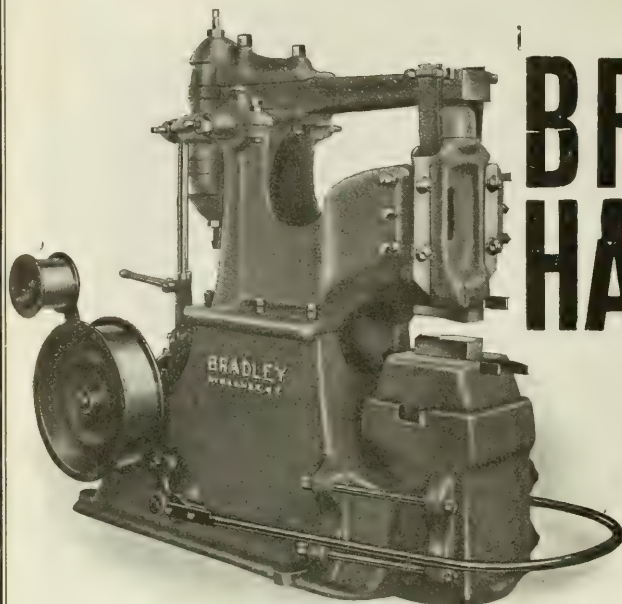
Now is the time to cut expenses. A request from you for an Oakite service man to call to look over your cleaning problem places you under no expense or obligation whatever. Write to-day.

Resident Canadian Representatives: Mr. C. P. Murphy, Toronto, and Mr. C. Burgin, Montreal

**OAKITE** MANUFACTURED BY  
**OAKLEY CHEMICAL CO.**  
44 THAMES STREET · NEW YORK

*If interested tear out this page and place with letters to be answered.*





# BRADLEY HAMMERS

*Upright  
Helve Hammer*

## When the Work is Severe and Continuous

The Bradley Upright Helve Hammer is of that type in which the head or ram is operated vertically in guides or ways.

As the dies in this style of hammer are always parallel regardless of the opening between them, it is most desirable for general jobbing of a severe nature, where frequent variation in the size of stock occurs, and where forgings are made from flat stock that must be edged up.

The Bradley Upright Helve Hammer we recommend where the work is exceptionally severe and continuous. For work of a lighter nature of the same style the Bradley Upright Strap Hammer is our choice.

Bradley Hammers contain more material than others. The Anvil Blocks are much heavier in proportion to weight of head. Their design and the workmanship put upon them are of the highest order. They are Cushioned Hammers in the very best sense of the word. These are some of the features that justify us in guaranteeing them to do a quarter more work with less power and fewer repairs than any other belt Hammer in the world.

*"Forge  
Ahead  
with a  
Bradley  
Hammer"*

**C. C. BRADLEY & SON, Inc.**  
**SYRACUSE, N.Y.**

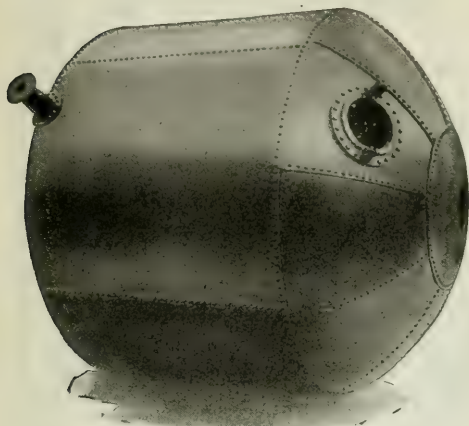
*Bradley Hammer Builders for 49 Years*

FOREIGN AGENTS: England, Buck & Hickman, Ltd., London; France, Fenwick Freres & Co., Lyons, Rhone; Italy, Fenwick Freres & Co., Turin; Belgium, Fenwick Freres & Co., Liege; Brazil, Fenwick Freres & Co., Rio de Janeiro;

Switzerland, Fenwick Freres & Co., Zurich; Portugal, Fenwick & Co., Lisbon; Spain, Fenwick Freres & Co., Barcelona; Alsace-Lorraine, Fenwick Freres & Co., Luxembourg; China, Anderson Meyer & Co., Ltd., Shanghai.

# STEEL TANKS

LIGHT and HEAVY



**I**F it's a tank or any piece of steel plate construction we can make it.

*Here are a few of our lines:—*

## STORAGE TANKS

for—

Oil Refineries  
Oil Distributing Stations  
Sugar Refineries  
Distilleries  
Packing Houses  
Soap Works  
Chemical Works  
Asphalt Plants  
Cyanide Installations  
Varnish Works

## PRESSURE TANKS

Filter Tanks  
Air Receivers  
Hydro-Pneumatic Tanks  
Hot Water Tanks

Blow-off Tanks  
Steam Jacketed Tanks

## BINS and HOPPERS

for—

Coal and Ash Handling Systems  
Grain Elevators  
Mines and Quarries

## SMOKE STACKS

## BOILER BREECHINGS

## RIVETED STEEL PIPE

## PENSTOCKS

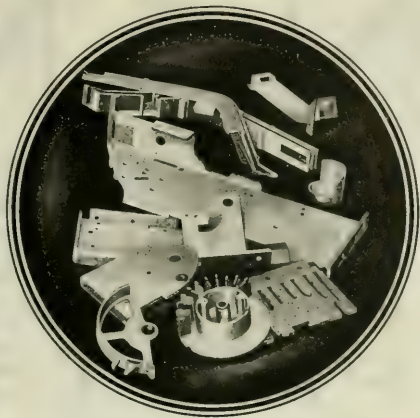
## CAISSONS

## TANK WAGONS

Consult us about your requirements or for Acetylene or Electric Welding.

## THE TORONTO IRON WORKS

HEAD OFFICE: LIMITED WORKS:  
ROYAL BANK BLDG. TORONTO CHERRY STREET



Franklin Die-Castings Used in Vending Machines

## Speeding Up Distribution

The strenuous life of to-day has practically crowded out leisure even at meals. "Automats," which now supplant old time taverns, save the business man valuable time, while smaller vending machines for distributing confections and matches add to his comforts.

This need for speedy distribution has been aided by the application of Die-Castings to vending machines.

In 1892 we originated the Die-Casting Process, and for nearly thirty years we have been reducing the cost and simplifying the output in many fields of industry. The addition of the standard No. 12 Aluminum to the Tin, Lead and Zinc base alloys already in use has enabled us to meet a still wider range of individual needs.

*We quote from samples or blueprints*

*Write for booklet:*

*"Franklin Die-Castings in Many Fields."*

## FRANKLIN DIE-CASTING CORPORATION

Gifford and Magnolia Streets

Syracuse, N. Y.

# FRANKLIN DIE-CASTINGS



# NAMCO

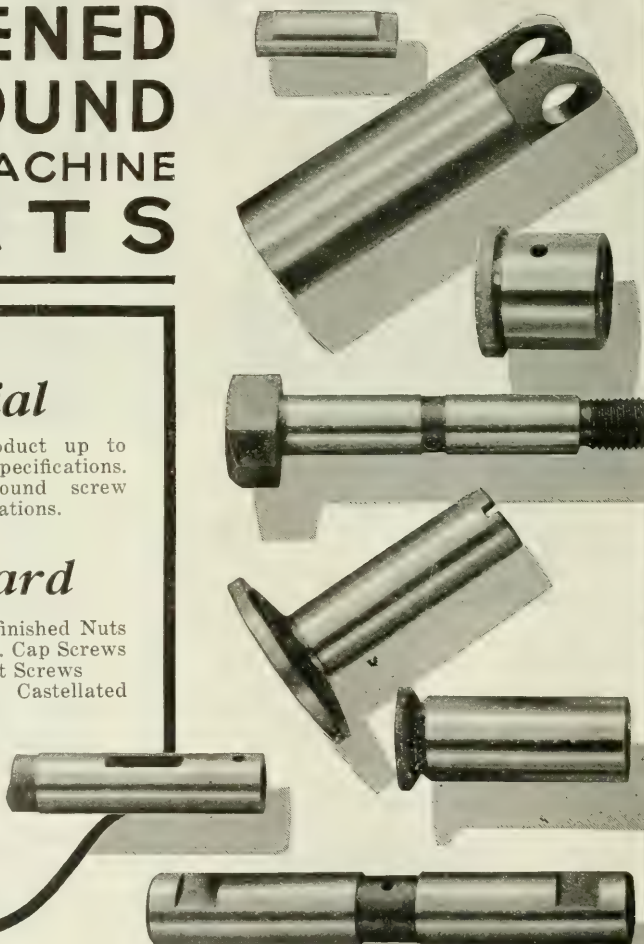
## HARDENED AND GROUND SCREW MACHINE PARTS

### *Special*

Screw machine product up to  
2 1/4 in. diam.—to specifications.  
Hardened and ground screw  
product—to specifications.

### *Standard*

✓ U. S. S. Semi-finished Nuts  
✓ U. S. S. & S. A. E. Cap Screws  
✓ U. S. S. Set Screws  
S. A. E. Plain and Castellated  
Nuts.



THE NATIONAL ACME COMPANY  
MONTREAL, P.Q.

De Courcelles

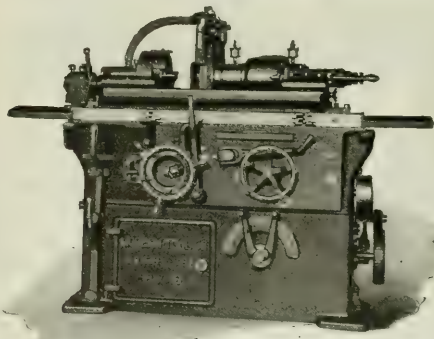
G.T.R.R.

# MODERN

Self-  
Contained

## Plain Grinding Machines

Fully  
Guarded



### ASK US

*--- what the outstanding  
quality of a "Modern"  
is and we'll answer in-  
stantly ---*

### DEPENDABILITY

BY THAT we mean the ability to stick to the job of producing. "Moderns" are strong and rugged. They are not easily put out of order. They are painstakingly made, and may be relied upon for accurate work in profitable volume. The extra strength of a Modern admits of a much wider scope of work without loss of efficiency. Modern are noted for both volume and accuracy of work.

Among the special features are:

- Full self-contained—Fully Guarded*
- All controls centered on front.*
- Silent chain work drive*

Made in 8 sizes—8" x 18" to 16" x 60"

*Send for technical bulletin*

## MODERN TOOL CO., ERIE, PA.

Main Office and Works: STATE and PEACH STREETS

#### BRANCH OFFICES:

Detroit, Mich., Kerr Bldg., 642 Beaubien St.  
Cleveland, Ohio, 408 Frankfort Ave.

Philadelphia, Pa., The Bourse  
Buffalo, N.Y., Associated Service Bldg.  
Export Dept., Bishop Bldg., New York, N.Y.

GRINDING MACHINE SALES AGENTS: Walter H. Foster Co., 50 Church Street, New York City, N.Y.; Sherritt & Stoer Co., 2006-2008 Market St., Philadelphia, Pa.; E. L. Essley Machine Co., 551-557 Washington Blvd., Chicago, Ill. Branches: Milwaukee, Wis.; Moline, Ill.; Manning, Maxwell & Moore, Inc., Railway Exchange Bldg., St. Louis, Mo.; English Tool & Supply Co., 930 Grand Avenue, Kansas City, Mo.; F. E. Satterlee Co., 120 Washington, N., Minneapolis, Minn.; Herberts Machinery & Supply Co., Los Angeles and San Francisco.

FOREIGN REPRESENTATIVES: Yamatake Company, Tokyo, Japan; Leo C. Steinle, 53 Victoria St., London, S.W., England; Glaenger & Perreaud, 18 and 20 Faubourg du Temple, Paris, France; Rylander & Asplund, Stockholm, Sweden; C. Civita & Company, Milan, Italy; J. Lambercier & Co., Geneva and Zurich, Switzerland; Rudel-Belnap Machinery Co., Ltd., Toronto and Montreal.



# MADE IN CANADA



## DOMINION

### Grinding Wheels Shipped Abroad

Dominion Grinding Wheels appeal to overseas buyers for the following reasons:

- 1—No delay in filling orders.
- 2—Highest quality products.
- 3—Made true to grain and grade.
- 4—Unfailing in service.
- 5—Sold at reasonable prices.

**Dominion Abrasive Wheel Co.,  
Limited**

MIMICO, ONTARIO, CANADA

# Grinding Wheels

FOREIGN REPRESENTATIVES—Hugh Scott Young, Melbourne, Australia; E. & J. Denis & Co., Brussels, Belgium; Riolet Dufom, Paris, France; La Maquinaria, Anglo-Americana, Barcelona, Spain; Dominion Abrasive Wheel & Supply Company, Birmingham, England.



Our plant is equipped to handle special machinery of any kind to blue print. Engineering department always available for consultation.

## Special Machinery

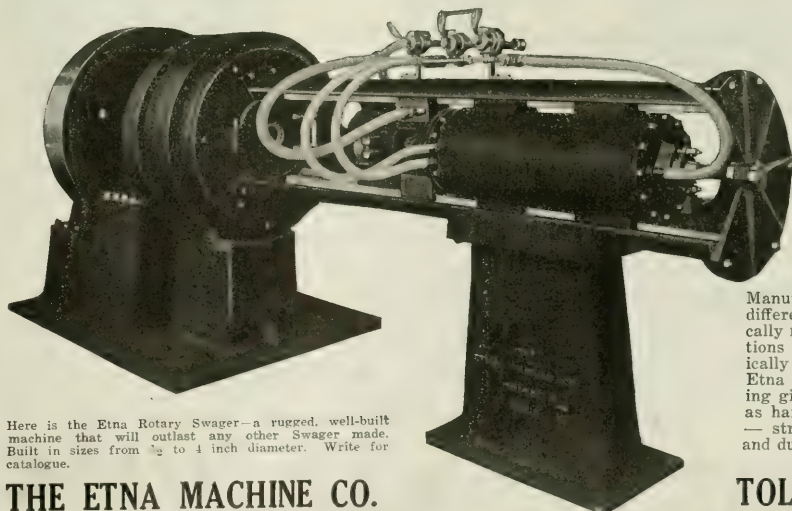
### GREY IRON CASTINGS

Large machine shop with extraordinary facilities. We are in best possible position to co-operate on manufacturing or production problems for home or export trade.

Grey Iron foundry has capacity of 15 tons. Mixture by chemical analysis and all castings sandblasted.

**MacFarlane Engineering Limited, Paris, Ont.**

# ETNA SWAGING



Here is the Etna Rotary Swager—a rugged, well-built machine that will outlast any other Swager made. Built in sizes from 2 to 4 inch diameter. Write for catalogue.

**THE ETNA MACHINE CO.**

Swaging the "Etna" Way Reduces Costs on Many Classes of Work

Manufacturers of widely different lines find practically no limit to the operations that can be economically performed on an Etna Swager. Etna Swaging gives the same results as hammer blows, namely — strength, smoothness and durability.

**TOLEDO, OHIO**



# Overhaul Your Furnaces Now

**I**T WAS neither feasible nor politic to shut down your furnaces when prices were at the top and demand was greater than supply. Everything had to be sacrificed to production! Cost was a secondary consideration.

But those days have gone and now we are faced with the necessity of getting down to bed-rock in the matter of production costs, or going to the wall.

Lloyd George says Germany must pay her debts to the Allies in goods—that means low-priced imports, and if the home market is to be kept for Canadian manufacturers, they must set their house in order and look carefully after their manufacturing costs.

“Oilgas” furnaces have proved to be a most important factor in helping many Canadian manufacturers to cut their heat treatment costs in two. What they have done for others they can and will do for you.

Our Engineers are available for conference at your plant any time at your convenience, without any obligation on your part.

Oilgas furnaces are different. They are made in Canada with Canadian capital.

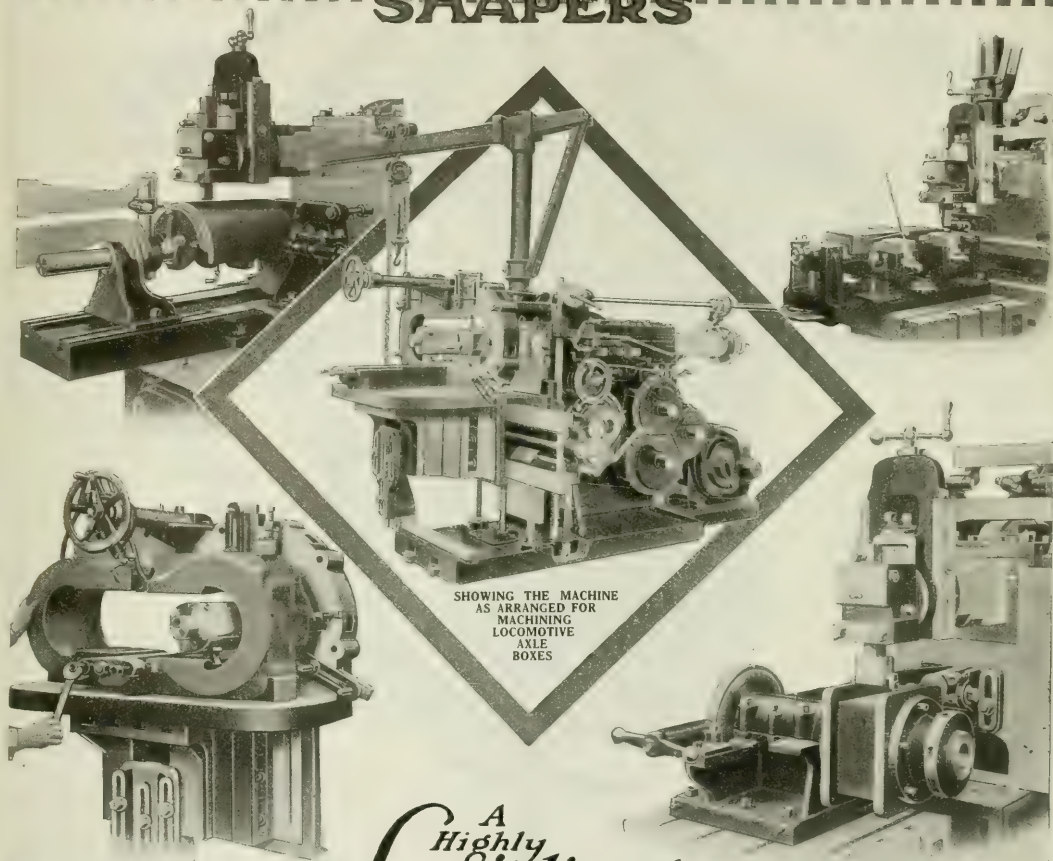
Every furnace bought abroad adds to the discount at which Canadian funds are held. Patronize home industries.

**GENERAL COMBUSTION COMPANY  
OF CANADA, LIMITED**  
**NEW BIRKS BUILDING, MONTREAL**

*“Industrial Furnaces for Every Duty”*

# MORTON

## HEAVY DUTY RAILROAD SHAPERS



*A Highly Specialized*

### MULTI-DUTY MACHINE

THIS Morton Heavy-Duty Draw-Cut Railroad Shaper is a specialized tool of exceptional design.

It is a multi-duty machine and the ease and rapidity with which changes are made from one class of work to another are features which make it a highly profitable producer. Fully equipped with the latest time-saving devices! A machine of maximum rigidity! Deep cuts, coarse feeds, and smooth and accurate work make it a tool of outstanding ability.

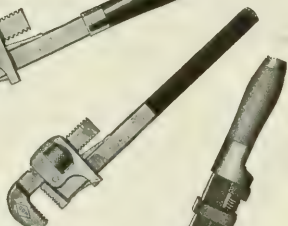
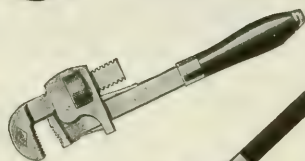
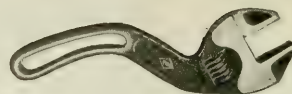
Send for bulletin 6A—it contains a complete and interesting story of this finely built tool.

**MORTON MANUFACTURING CO.**  
MUSKEGON HEIGHTS, MICHIGAN, U.S.A.





MADE  
IN  
CANADA



## WILLIAMS' SUPERIOR WRENCHES

In addition to our Standard Superior Drop-Forged Wrenches and Machinists' Tools, we manufacture the most comprehensive line of adjustable wrenches on the market. All have our reputation behind them.

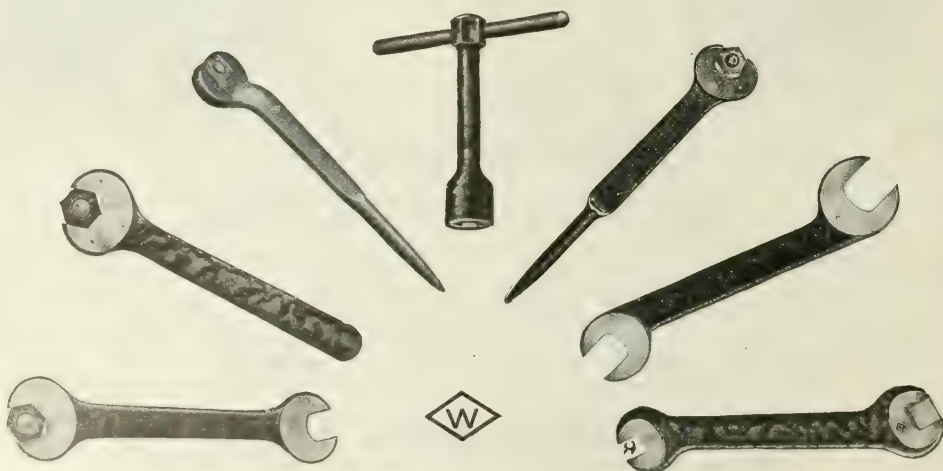
*Catalog on Request.*

**J. H. WILLIAMS & Co., Limited**  
"The Wrench People"

Formerly Canadian Division of  
The Whitman & Barnes Mfg. Co.

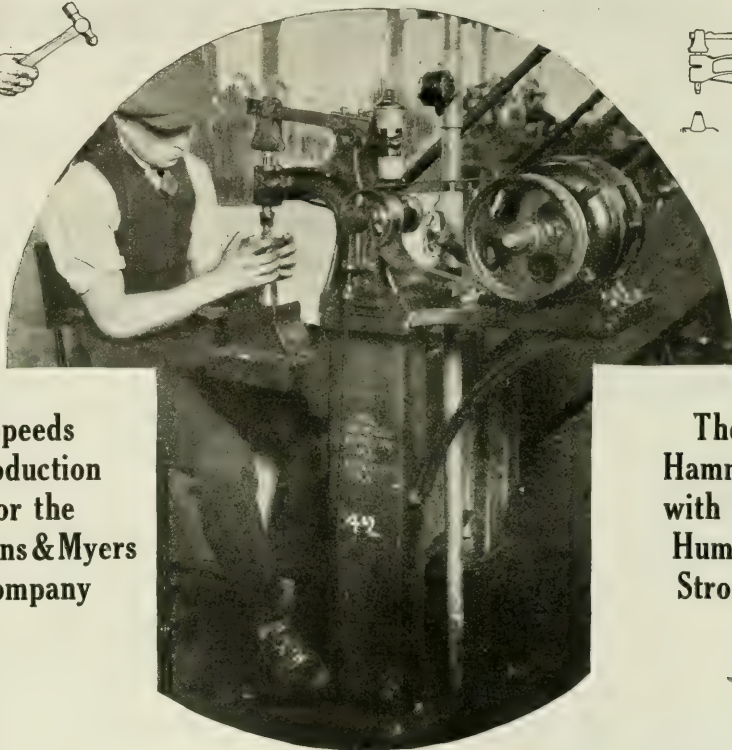
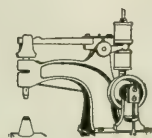
45 Thorold Road

St. Catharines, Ont.



# HIGH SPEED

## RIVETING HAMMERS



**Speeds  
Production  
for the  
Robbins & Myers  
Company**

**The  
Hammer  
with the  
Human  
Stroke**

**A**N immediate production increase was the result of installing a High Speed Riveting Hammer in the plant of the Robbins & Myers Co., Brantford, Ont.

The work caught by our camera man is Riveting Formed Fan Punching to hub. It demands neatness and speed—to conform to the high standards of this plant.

It takes just half a minute for this work — no comparison with the laborious method of hand sledging. Send us samples or blue-prints and we will quote production figures.

Besides often as much as quadrupling production, High Speed Hammers also better the quality. Hand work cannot approach them for uniformity and fine finish.

**THE HIGH SPEED HAMMER COMPANY, Inc.**  
ROCHESTER, N.Y., U.S.A.

**FOREIGN AGENTS:**—For British Isles: Burton Griffiths & Co., Ltd., London, E.C.  
For Sweden and Finland: Aktiebolaget Rylander & Asplund, Stockholm, C.  
For Japan and Dependencies: China, Japan and South America Trading Company, Ltd., Kobe.



## These Workers Need

# STOCO SAFETY GOGGLES

(Pat Dec. 12, 1916)

|   |  |
|---|--|
| Air drill operator.   | Fireman, locomotives.  |
| Air hammer operator.  | Flue setter, locomotive.   |
| Asphalt cutter.   | Furnace reliner.   |
| Bessemer—Manganese man.   | Gage glass replacer.   |
| Boiler cleaner.   | Grinder, rough emery, welding shop, foundry<br>or machine shop, etc. |
| Boiler maker.   | Holder on and bucket up.   |
| Boiler repairman.   | Machine tool dresser.  |
| Buffer.   | Machine tool operator—on tool steel, cast iron,<br>brass, etc.       |
| Car repairman, metal.   | Mailing machine adjuster.  |
| Casting house worker.   | Open hearth stoker.  |
| Caulker.  | Planer operator.   |
| Cement gun operator.  | Pneumatic tool worker and those working in<br>close proximity.       |
| Chipper, welding shop, foundry, machine shop,<br>etc.                         | Reamer.  |
| Cinder man.   | Rivet cutter.  |
| Concrete chipper or cutter.   | Riveter.   |
| Core remover—large castings.  | Roll grinder.  |
| Cupola tender, charger or tapper.   | Rolling mill—worker on rolls and ragger.                             |
| Cutter—with chisel, hammer or sledge.   | Scaler—steel bars or plate.  |
| Dresser of tools.   | Shaper operator.   |
| Drill press operator, high speed.   | Sledger of rock or other hard substances.                            |
| Driller and countersinker or drill press hand<br>in ship shed or boiler shop. | Staple machine adjuster.   |
| Driller of concrete, stone, brick, coal, cast<br>iron, etc.                   | Stone cutter.  |
| Emery wheel grinder.  | Stone breaker.   |
| Engineer, electric and steam locomotive.                                      | Tank cleaner.  |
| Ferromanganese breaker.   | Tool dresser.  |
| Firemen's helper.   | Tool grinder (street railway).                                       |
|   | Turret-lathe operator.   |

This is the List of occupations for which type No. 2 Goggles are specified in the Pennsylvania State Industrial Board's "Safety Standards" for Head and Eye Protection.

A sample of the Stoco Safety Goggle will be sent interested responsible people—without charge—on receipt of request on letter-head. The price of the Stoco Safety Goggle is 90 cents each—\$1.15 each with "Celoglas" Shatter-Proof Lenses—f.o.b. Geneva, N. Y. Interesting discounts from those prices are allowed for quantity orders.

## THE STANDARD OPTICAL CO. GENEVA N.Y.

## Have you the tools that this job calls for?

*A Starrett Thread Gage, Micrometer,  
Bench Micrometer, Micrometer Caliper  
Stand, and Taper Gage.*

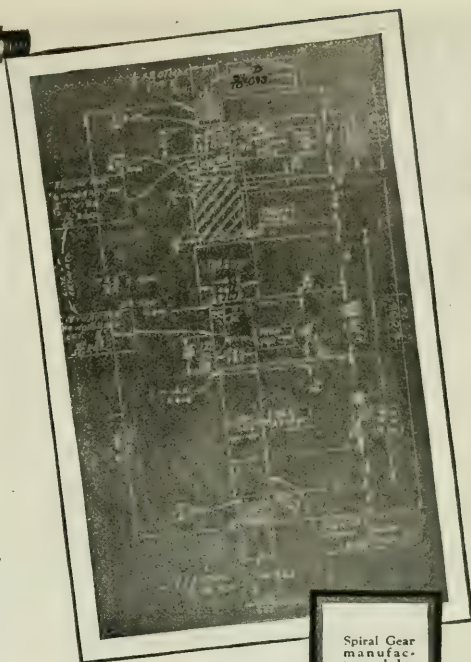
Spiral gear cutting calls for the best there is in workmanship and tools, and because of their reputation for accuracy, two generations of machinists, to whom accuracy is a matter of pride as well as livelihood, have shown a decided preference for Starrett Tools.

Check up your personal kit with the new Starrett Catalog No. 22 "3" Sent free upon request.

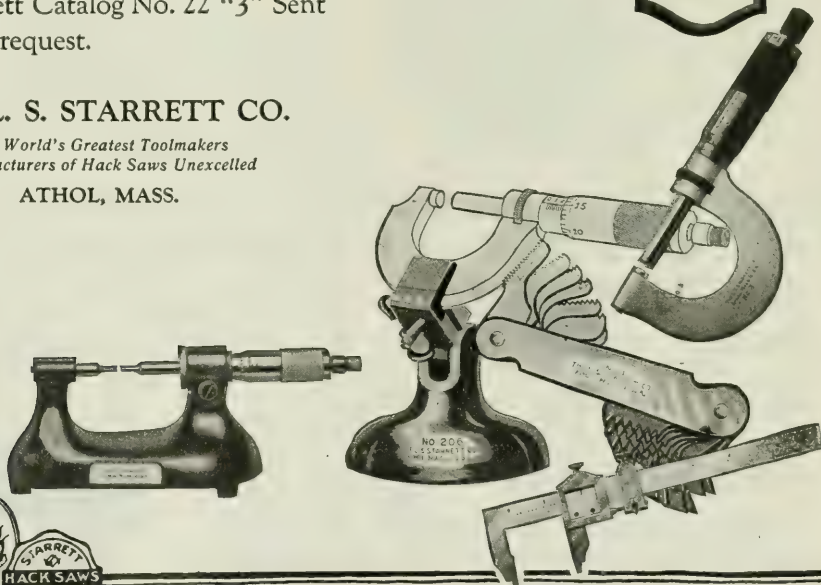
### THE L. S. STARRETT CO.

*The World's Greatest Toolmakers  
Manufacturers of Hack Saws Unexcelled*

ATHOL, MASS.



Spiral Gear  
manufactured  
by  
the Crofoot  
Gear Works  
Boston,  
Mass.



# Use Starrett Tools



# HINTS TO BUYERS

## STEEL CASTINGS

**E**LECTRIC Steel Castings of  
all kinds from 5 pounds to  
5,000 pounds.

PROMPT DELIVERY

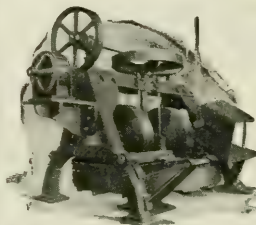
**Manitoba Steel Foundries, Ltd.**

1204 McArthur Building

Winnipeg

Manitoba

## Canadian Steel Foundries Need Frost Improved Sand Mills



### WINNING FEATURES

Heavy Mullers  
Unloading Device  
Motor or Belt Drive

**The Frost Mfg. Co.**  
112 W. Adams St., Chicago

## The Hughes Owens Co. Ltd.

MONTREAL TORONTO OTTAWA WINNIPEG

*Manufacturers*

Blue and Black Print Papers  
Drawing Office Supplies for Students,  
Architects and Engineers.

## Mechanical Engineering Company

Limited

PRACTICAL AND CONSULTING ENGINEERS

*Builders of "MECOL" Industrial  
Furnaces for use with oil,  
gas or coal fuel*

Executive Offices  
Room 408, 3 St. Nicholas St.  
Montreal

General Offices and Works  
Three Rivers, Que.

## FOR SERVICE ON

**Jigs, Fixtures, Gauges  
SPECIAL MACHINE TOOLS  
SPECIAL MACHINERY**

General Machine Work and Repairs

*Write*

**The Crescent Machine Co.  
LIMITED**

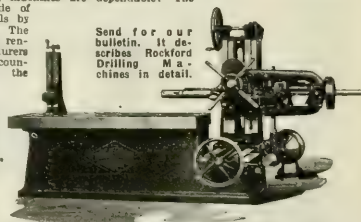
20 Longueuil Lane Montreal, Que.

## ROCKFORD DRILLING MACHINES

Note the lateral and vertical adjustment of this Rockford Drilling Machine. It operates anywhere on a surface 18" high by 36" wide! Rockford Drilling Machines are dependable! They are carefully made of the finest materials by skilled workmen. The service they are rendering manufacturers throughout the country proves that the design is right.

The Rockford  
Drilling Machine  
Company  
Rockford, Ill., U.S.A.

Canadian Agents:  
Rudel-Beinap  
Machinery Co.,  
Toronto and  
Montreal.

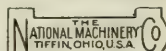


Send for our  
bulletin. It de-  
scribes Rockford  
Drilling Ma-  
chines in detail.



## BOLT, NUT, FORGING AND WIRE NAIL MACHINERY

"National" Bolt Cutters, "Wedge Grip" Bolt and Rivet Headers, Forging Machines, Nut Machines, Roll Threaders and Wire Nail Machines are used by leading Railroads and Industrials.



CANADIAN AGENT  
**H. W. PETRIE, Ltd.**  
TORONTO, ONT.  
MONTREAL, QUE.  
VANCOUVER, B.C.

**WHEEL TRUEING TOOL CO.**

IMPORTERS OF **INDUSTRIAL DIAMONDS** DETROIT **DIAMOND POINTED TOOLS** MANUFACTURERS OF

Goods Submitted on Memorandum if Desired  
JOHN W. GORDON, Manager  
5 James Street, ST. CATHARINES, ONTARIO

All Mountings Fully Guaranteed  
Office and Factory:  
88 West Pitt Street, WINDSOR, ONTARIO




### Gear Cutting Machines

Hand Feed  
Semi-Automatic, Fully Automatic  
Also Lathe Chucks and  
Centering Machines

THE D. E. WHITON MACHINE CO.  
NEW LONDON, CONN., U. S. A.

### PRESSES and SHEARS

Sheet Metal Working Machinery  
**THE D. H. STOLL CO., INC.**  
26 Lansing St., BUFFALO, N.Y.

### DIE-CASTINGS

ACCURACY—SERVICE



**Fisher Motor Co., Ltd.**  
ORILLIA - ONTARIO

### DARLING BROTHERS, LIMITED

Engineers, Manufacturers and Founders  
120 Prince Street, MONTREAL, P.Q.

*Pumps for any Service—Steam Appliances—  
Freight Elevators—Webster Vacuum  
Heating System.*



### SPRING SHACKLE BOLTS

Complete Line of Oilers,  
Oil Cups, Brass Dowel Pins  
and Pressed Steel and Brass  
Grease Cups All Types

Write for catalogues and prices

**THE CANADIAN WINKLEY CO.**

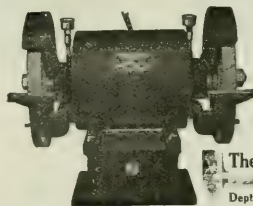
Limited

WINDSOR - ONTARIO



PLAIN

### CINCINNATI Portable Electric Bench Grinder



A practical time-saver for machine shops, mills and garages. Adapted for grinding, buffing and polishing of all kinds.

**The Cincinnati Electrical Tool Company**  
Dept. G-4 Cincinnati, O.

Makers of complete line of Portable Electric Drills and Grinders

### CASTINGS

MALLEABLE AND GREY IRON  
**FITTINGS** Limited, OSHAWA

### Miller Bros. & Sons, Limited

Founders, Machinists, Millwrights  
and Engineers

120 Dalhousie St., Montreal

**VICTORIA Special Machinery**  
DESIGNS PATTERNS  
CASTINGS FORGINGS

Send for Catalogue

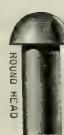
**Victoria Foundry Co., Limited, Ottawa, Canada**



### NORTON JACKS

FOR ALL KINDS OF HEAVY LIFTING  
Send for complete catalogue, showing  
50 styles 10 to 100 tons capacity.

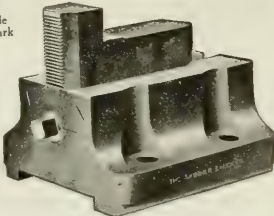
Made only by **A. O. NORTON, Limited**  
Coaticook, Prov. Quebec, Canada



WE MANUFACTURE RIVETS of every description,  $\frac{5}{8}$  inch dia. and smaller

**PARMENTER & BULLOCH CO., LTD.**  
GANANOQUE, ONT.





Trade Mark

## SKINNER BORING MILL JAWS

Note the powerful compact construction of these sturdy jaws. For heavy "duty" work on boring mills and large lathes these jaws, fitted to the parallel slots in the face plate or table by means of the double rib, insure a most positive grip.


*Furnished in iron or steel body—single or double rib as desired*

**THE SKINNER CHUCK COMPANY**

NEW BRITAIN, CONN. U.S.A.

Established 1887

New York Office: San Francisco Office: Chicago Office:  
 94 Reade Street. Rialto Building 552 West Washington Blvd.  
 London Office: 139 Queen Victoria St., E.C. 4



**KELLER-MADE MASTER-BUILT**

### Pneumatic Tools

Wire at our expense for a representative—or complete catalog describing

**KELLER-MASTER —**

|                      |                  |
|----------------------|------------------|
| Riveting Hammers     | Valveless Drills |
| Chipping Hammers     | Rivet Cutters    |
| Scaling Hammers      | Sand Rammers     |
| Jam Riveters         | Holders-On       |
| Staybolt Riveters    | Grinders         |
| Corliss Valve Drills | Accessories      |

**KELLER PNEUMATIC TOOL CO.**  
 GRAND HAVEN · MICHIGAN · U.S.A.  
 BRANCHES EVERYWHERE

## S


## PECIAL MACHINERY

### Built to Order

Also gauges, punches, jigs, dies, small tools, etc.  
 Prompt Service.  
 Moderate cost.  
 Send Blueprints for estimate.

**Brown Engineering Corporation LIMITED, TORONTO**  
 415-419 King St., W. Tel. Ad. 425

MADE IN



CANADA

## Monel Metal Castings

For Anti-Corrosive and Superheat Service

Made in Canada by

### CANADIAN DRIVER-HARRIS CO.

WALKERVILLE, ONT.  
 America's Office and Works  
 Harrison, N. J.

Chicago · Detroit      England · France



**THE STANDARD FOR EXCELLENCE**

**"GUSHMAN" CHUCKS**  
 1862

**YOUR DEALER WILL FURNISH THEM**

*Known Everywhere*



# THE

TRADE



MARK

# FOUNDRY

## GALT, ONT.

## Do Your Castings Cost Too Much?

A rearrangement of your patterns might cut their cost 25 per cent.; a different method of molding them might double your production at no increase in molding cost. We can advise you and we have expert metal and wood patternmakers who are able to make any changes that may commend themselves to you.

### If you need some new Patterns

send us a sample, blueprint or sketch, and ask for our advice. It won't cost you anything. If our advice is good and commends itself to you, it is only fair to assume that our work will be equally satisfactory, and we need the work as badly as you need the patterns.

We are in a position to do turning, boring, drilling or other semi-finishing operations on castings supplied by us. **Ask us.**

*We have for our and your requirements, a large stock of assorted White Iron Stars, suitable for light agricultural to medium weight machinery castings, while they last, at 8 cents per lb. F. O. B. Galt.*

*If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.*



**Any Kind of Gear**

We make a specialty of rawhide and silent Micarta Pinions for noiseless drives.

"Hurry Orders and Break-Down Jobs" receive special attention. Try a catalogue—it's interesting, and contains a lot of gear data.

**Philadelphia GEAR Works**  
Vine St., Philadelphia, Pa.



**UNION DRAWN STEEL CO. LTD.**

Manufacturers of  
**Bright Finished Steel Shafting and Shapes.**

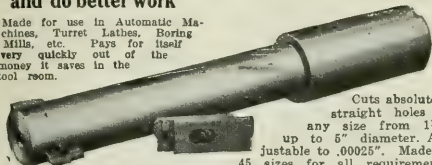
Large stock of all sizes.

**HAMILTON, ONTARIO**

**Send for Price List**

**Madison Adjustable Boring Cutters and Bars**  
Take the place of REAMERS and do better work

Made for use in Automatic Machines, Turret Lathes, Boring Mills, etc. Pays for itself very quickly out of the money it saves in the tool room.



Cuts absolutely straight holes of any size from  $1\frac{1}{4}$ " up to 6" diameter. Adjustable to .00025". Made in 45 sizes for all requirements. Write for prices and literature.

**MADISON MANUFACTURING COMPANY**  
MUSKEGON, MICHIGAN, U.S.A.



**A BALATA BELTING**

**Which We Guarantee Second To None And Entirely Satisfactory**

Try One And Be Convinced

**J.C. McLAREN BELTING CO. Limited**  
MONTREAL TORONTO WINNIPEG

**TRADE MARK**  
THE J.C. McLAREN BELTING CO. LIMITED

**Put Economy Into Your Drilling**

**AURORA Drilling Machines**

Aside from the Accuracy, Convenience and Quick-Operating features of Aurora Drills, there's Economy to consider. Aurora Drills conserve both power and labor.

Built in Stationary and Sliding Head sizes.

The  
**Aurora Tool Works**  
Aurora, Ind.



**SHAFTING**

Cold Drawn, Turned and Polished Steel, Rounds, Squares, Hexagons and Flats, Steel Piston Rods, Pump Rods.

Special facilities for Keyseating up to 6 in. diameter.

**THE Canadian Drawn Steel Co. Limited**  
HAMILTON CANADA

**DAVIS-BOURNONVILLE**

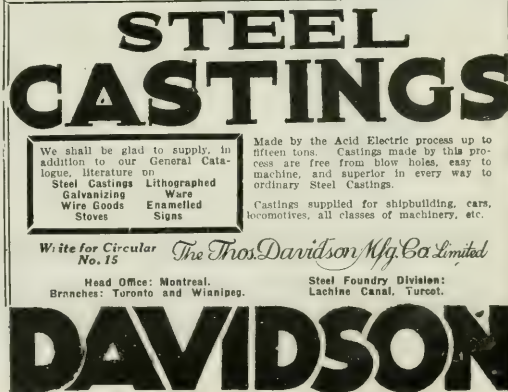
Tube welding machines for producing 100 per cent. strength tubing from commercial sheets or rolled strip stock in steel, brass, nickel and other metals. Equipment for swaging and drawing tubing to square, rectangular and other shapes required in furniture and bedstead manufacture. Tube plant layouts.

Oxy-acetylene welding torches, pressure regulators, acetylene generators.



**Davis-Bournonville Company**  
Jersey City, N.J.

Branches in Principal Cities



**STEEL CASTINGS**

We shall be glad to supply, in addition to our General Catalogue, literature on Steel Castings Lithographed Galvanizing Ware Wire Goods Enamelled Stoves Signs

Made by the Acid Electric process up to fifteen tons. Castings made by this process are free from blow holes, easy to machine, and superior in every way to ordinary Steel Castings.

Castings supplied for shipbuilding, cars, locomotives, all classes of machinery, etc.

Write for Circular No. 15 *The Thos. Davidson Mfg. Co. Limited*

Head Office: Montreal.  
Branches: Toronto and Winnipeg.

Steel Foundry Division:  
Lachine Canal, Turcot.

**DAVIDSON**



The New

Your Dealer Has It

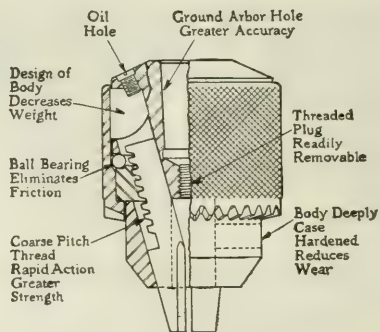
# Jacobs *Super* Chuck

PATENTED 1909-1915  
OTHER PATENTS PENDING

Just A Few Outstanding Features



*The Best  
Money Can  
Produce  
-or Buy*



The Jacobs Manufacturing Company/  
Hartford, Conn., U.S.A.

# Canadian Machinery TYPES DIRECTORY

If what you want is not here, write us, and we will tell you where to get it. Let us suggest that you consult also the advertisers' index—last page of book, after having secured advertisers' names from this directory. The information you desire may be found in the advertising pages. This department is maintained for the benefit and convenience of our readers. The insertion of our advertisers' names under proper headings is gladly undertaken, but does not become part of an advertising contract.

## Abrasive Discs

Norton Co. of Can., Ltd., Hamilton, Ont.  
Osley & Sons, Ltd., John, London & E., Eng.

## Abrasive Materials

Can. Hart Products, Ltd., Hamilton, Ont.  
Dom. Abrasive Wheel Co., Ltd., Almon, Ont.  
Norton Co. of Can., Ltd., Hamilton, Ont.  
Osley & Sons, Ltd., John, London & E., Eng.  
Waltham Grinding Wheel Co. of Canada, Ltd., Brampton, Ont.

## Acetylene, Dissolved

L'Air Liquide Society, Toronto, Ont.

## Accumulators, Hydraulic

Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.  
Stewart & Co., Duncan, Glasgow, Scot.

## Air Cocks

Puro Sanitary Drinking Fountain Co., Haydenville, Mass.

## Air Lifts

Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.

## Independent Pneumatic Tool, Chicago, Ill.

## Analyses, Chemical

Toronto Testing Laboratory, Toronto, Ont.

## Angle Bars

Steel Co. of Canada, Ltd., Hamilton, Ont.

## Anvils

Albion Hardware Ltd., Toronto, Ont.  
Atkins & Co., Inc., E. C., Indianapolis, I.  
Columbia Hdw. Division, Cleveland, O.  
Petrie, Ltd., H. W., Toronto, Ont.

## Arbors

Atkins & Co., Inc., E. C., Indianapolis, I.  
Brown & Sharpe Mfg. Co., Providence, R.I.  
Cleveland Twist Drill Co., Cleveland, O.  
Ford-Smith Machine Co., Hamilton, Ont.  
Ingersoll Machine & Tool Co., Ltd., Ingersoll, Ont.  
Jacobs Mfg. Co., Hartford, Conn.  
Kearney & Trecker Co., Milwaukee, Wis.  
Kempnall Mfg. Co., Milwaukee, Wis.  
Frat & Whitney Co. of Canada, Ltd., Dundas, Ont.  
Skinner Chuck Co., New Britain, Conn.

## Arches

Dom. Foundries & Steel, Hamilton, Ont.

## Rabbit Metal

Atkins & Co., Inc., E. C., Indianapolis, I.  
British Smelting & Refining Co., Ltd., Montreal, Que.

## Canada Metal Co., Ltd., Toronto, Ont.

## Flasher Motor Co., Ltd., Orillia, Ont.

## Magnolia Metal Co., Montreal, Que.

## Balls, Brass, Bronze and Steel

Canada Foundries & Forgings Co., Welland, Ont.  
Canadian SKF Co., Toronto, Ont.  
Dom. Foundries & Steel, Ltd., Hamilton, Ont.  
Pilot Steel & Tool Co., Montreal, Que.  
Riley Roller Bearing Co., Syracuse, N.Y.

## Barrels, Tumbling

McDougall Co., Ltd., R., Galt, Ont.

## Bars, Boring

Armstrong Bros. Tool Co., Chicago, Ill.  
Bertram & Son Co., Ltd., The John, Dundas, Ont.  
Gisholt Machine Co., Madison, Wis.  
Madison Mfg. Co., Muskegon, Mich.

## Bars, Boring, Portable

Underwood Corp., H. B., Philadelphia, Pa.

## Bars, Bronze Cored

Moore & Son, Thos., Montreal, Que.

## Bars, Iron

Steel Co. of Canada, Ltd., Hamilton, Ont.

## Bars, Steel

Algonia Steel Corp., Ltd., Sault Ste. Marie, Ont.  
Armstrong-Whitworth of Canada, Ltd., Montreal, Canada.  
Canada Foundries & Forgings Co., Welland, Ont.  
Can. Steel Foundries, Montreal, Que.  
Dom. Foundries & Steel, Hamilton, Ont.  
W. S. Steel Co., Ltd., New Glasgow, N.S.  
Ontario Metal Products Co., Ltd., Toronto, Ont.  
Pilot Steel & Tool Co., Montreal, Que.  
Steel Co. of Canada, Ltd., Hamilton, Ont.  
Vanderbilt Alloy Steel Corp., Canton, Ohio.  
Vanguard Alloy Steel, Latrobe, Pa.

## Bearings, Ball

Canadian SKF Co., Toronto, Ont.  
Chapman Double & Ball Bearing Co., Toronto, Ont.  
Lang Mfg. Co., Guelph, Ont.  
Lymn Tube & Supply Co., Ltd., Toronto, Ont.  
Morrow Screw & Nut Co., Ltd., John, Ingersoll, Ont.

## Bearings, Roller

Rayway Roller Bearing Co., Syracuse, N.Y.

## Bearings, Bronze

Rayway Roller Bearing Co., Syracuse, N.Y.

## Bearings, Die-Cast

Flasher Motor Co., Ltd., Orillia, Ont.  
Franklin Die-Casting Corp., Syracuse, N.Y.  
Tallman Brass & Metal Co., Hamilton, Ont.

## Bearings, Journal

Fisher Motor Co., Ltd., Orillia, Ont.

## Bearings, Roller

Can. Fairbanks-Morse Co., Ltd., Montreal, Que.  
Lang Mfg. Co., Guelph, Ont.  
Lymn Tube & Supply Co., Ltd., Toronto, Ont.  
Morrow Screw & Nut Co., Ltd., John, Ingersoll, Ont.

## Belt Cements

McLaren Belting Co., J. C., Montreal, Que.

## Belt Dressings and Fillers

Alkemade Hardware Ltd., Toronto, Ont.  
Dom. Belting Co., Ltd., Hamilton, Ont.  
Federal Eng'g Co., Ltd., Toronto, Ont.  
Graton & Knight Mfg. Co., Worcester, Mass.

## Belt Fasteners

Can. Consolidated Rubber Co., Ltd., Montreal, Que.  
Clippner Belt Lacer Co., Grand Rapids, Mich.  
Federal Eng'g Co., Ltd., Toronto, Ont.  
Graton & Knight Mfg. Co., Worcester, Mass.  
McLaren Belting Co., J. C., Montreal, Que.  
Rice Lewis & Son, Ltd., Toronto, Ont.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

## For list of Dealers see the last page of This Buyers' Directory

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Rayway Roller Bearing Co., Syracuse, N.Y.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can. Fairbanks-Morse Ltd., Montreal, Q.

Can



# BYERS' DIRECTORY

Union Carbide Co. of Can., Ltd., Welland, Ont.

**Cars, Ore**  
MacKinnon Steel Co., Sherbrooke, Que.

**Castings, Aluminum**  
Canada Electric Castings Co., Ltd., Orillia, Can. Hanson & Van Winkle Co., Toronto, Ont.  
Canada Metal Co., Ltd., Toronto, Ont.  
Tallman Brass & Metal Co., Hamilton, Ont.

**Castings, Brass and Bronze**  
Algonia Steel Corp., Ltd., Sault Ste. Marie, Ont.  
Canada Electric Castings Co., Ltd., Orillia, Can. Hanson & Van Winkle Co., Toronto, Ont.  
Canada Metal Co., Ltd., Toronto, Ont.  
Can. Driver-Harris Co., Walkerville, Ont.  
Electric Steel & Engineering Co., Welland, Ont.  
Tallman Brass & Metal Co., Hamilton, Ont.

**Castings, Copper**  
Can. Hanson & Van Winkle Co., Toronto, Ont.  
Tallman Brass & Metal, Ltd., Hamilton, Ont.

**Castings, Marine**  
Can. Steel Foundries, Montreal, Que.  
Dominion Foundries & Steel, Ltd., Hamilton, Ont.

**Castings, Die Molded**  
Fisher Motor Co., Ltd., Orillia, Ont.  
Franklin Die-Casting Corp., Syracuse, N.Y.  
Katie Foundry Co., Galt, Ont.  
Tallman Brass & Metal, Ltd., Hamilton, Ont.

**Castings, Ferro-Alloy**  
Can. Steel Foundries, Montreal, Que.

**Castings, Iron**  
Algonia Steel Corp., Ltd., Sault Ste. Marie, Ont.  
Bernard Industrial Co., A., Forterville, Que.

**Castings, Steel**  
Ellen Machine Co., Bridgeport, Conn.  
Brown, Boggs & Co., Ltd., Hamilton, Ont.  
Can. Hanson & Van Winkle Co., Toronto, Ont.  
Canada Electric Castings Co., Ltd., Orillia, Can. Hanson & Van Winkle Co., Toronto, Ont.  
Hepburn Ltd., John T., Toronto, Ont.  
Katie Foundry Co., Galt, Ont.  
Kennedy & Sons, Wm., Owen Sound, Ont.  
McDougall Co., Ltd., R., Galt, Ont.  
Victoria Foundry Co., Ltd., Orillia, Ont.  
Walker & Sons Metal Products, Ltd., Hiram, Walkerville, Ont.

**Castings, Hyd. Press**  
Can. Steel Foundries, Montreal, Que.

**Castings, Monel Metal**  
Can. Driver-Harris Co., Walkerville, Ont.

**Castings, Naval Bronze**  
Tallman Brass & Metal, Ltd., Hamilton, Ont.

**Castings, Nichrome**  
Can. Driver-Harris Co., Walkerville, Ont.

**Castings, Nickel**  
Can. Hanson & Van Winkle Co., Toronto, Ont.

**Castings, Semi-Steel**  
Davidson Mfg. Co., Thos., Montreal, Que.  
Hull Iron & Steel Foundry, Hull, Que.  
Katie Foundry Co., Galt, Ont.  
Manitoba Steel Foundries, Ltd., Winnipeg, Man.

**Castings, Steel**  
Dominion Foundries & Steel, Ltd., Hamilton, Ont.  
Can. Steel Foundries, Montreal, Que.  
Kennedy & Sons, Wm., Owen Sound, Ont.  
Swedish Crucible Steel Co. of Can., Ltd., Windsor, Ont.

**Cements, Iron**  
Smooth Mfg. Co., Jersey City, N.J.

**Centering Machines**  
Bertram & Son Co., Ltd., The John, Dundas, Ont.  
Garlock-Walker Mch. Co., Toronto, Ont.

**Chains (See Sprockets and Chains)**  
Morris Crane & Holst Co., Ltd., Niagara Falls, Ont.  
Morse Chain Co., Ithaca, N.Y.  
Philadelphia Gear Works, Philadelphia, Pa.  
Renold (Hans) of Canada, Ltd., Montreal, Que.  
Wright Mfg. Co., Lisbon, Ohio.

**Chains, Driving**  
Can. Link-Belt Co., Toronto, Ont.  
Greenfield Tap & Die Corp., Galt, Ont.  
Jones & Glasco, Montreal, Que.  
Morse Chain Co., Ithaca, N.Y.  
Renold (Hans) of Canada, Ltd., Montreal, Que.  
Wright Mfg. Co., Lisbon, Ohio.

**Chasers**  
Bertram & Son Co., Ltd., The John, Dundas, Ont.  
Jones & Lamson Machine Co., Springfield, Vt.  
Landis Machine Co., Inc., Waynesboro, Pa.  
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

**Chemists**  
Toronto Testing Laboratory, Toronto, Ont.

**Chequing Machines**  
Acme Machine Tool Co., Cincinnati, Ohio.  
Brown & Sharpe Mfg. Co., Providence, R.I.

Gisholt Machine Co., Madison, Wis.  
Jones & Lamson Machine Co., Springfield, Vermont.  
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.  
Steinle Turret Machine Co., Madison, Wis.  
Warner & Swasey Co., Cleveland, Ohio.

**Chucks, Drill**  
Jacob Mfg. Co., Hartford, Conn.

**Chucks, Drill and Tap**  
Alkenhead Hardware Ltd., Toronto, Ont.  
Can. Fairbanks-Morse Co., Ltd., Montreal, Que.  
Cushman Chuck Co., Hartford, Conn.  
Cushman Chuck Co., Hartford, Conn.  
Dem. Steel Products Co., Brantford, Ont.  
Morrow Screw & Nut Co., Ltd., John, Ingersoll, Ont.  
Morse Twist Drill & Machine Co., New Bedford, Mass.  
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.  
Skinner Chuck Co., New Britain, Conn.  
Union Mfg. Co., New Britain, Conn.  
Williams & Wilson, Ltd., Montreal, Que.

**Chucks, Lathe**  
Alkenhead Hardware Ltd., Toronto, Ont.  
Can. Fairbanks-Morse Co., Ltd., Montreal, Que.  
Cushman Chuck Co., Hartford, Conn.  
Dem. Steel Products Co., Brantford, Ont.  
Foss Machinery & Supply Co., Geo. F., Montreal, Que.  
Geometric Tool Co., New Haven, Conn.  
Gisholt Machine Co., Madison, Wis.  
Katie & Goodwin Machine Co., Brantford, Ont.  
Petrie, Ltd., H. W., Toronto, Ont.  
Skinner Chuck Co., New Britain, Conn.  
Union Mfg. Co., New Britain, Conn.  
Williams & Wilson, Ltd., Montreal, Que.

**Chucks, Magnetic**  
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

**Chucks, Planer**  
Bertram & Son Co., Ltd., The John, Dundas, Ont.  
Cushman Chuck Co., Hartford, Conn.  
Skinner Chuck Co., New Britain, Conn.  
Union Mfg. Co., New Britain, Conn.

**Chucks, Vertical Boring Mill**  
Bertram & Son Co., Ltd., The John, Dundas, Ont.  
Gisholt Machine Co., Madison, Wis.  
Skinner Chuck Co., New Britain, Conn.  
Union Mfg. Co., New Britain, Conn.

**Clamps, Machinists**  
Columbia Hove, Division, Cleveland, O.  
Dickow, Fred C., Chicago, Ill.  
Starrett Co., L. S., Athol, Mass.

**Cleaners, Metal, Waste, General**  
Can. Hanson & Van Winkle Co., Toronto, Ont.  
Oakley Chemical Co., New York, N.Y.

**Clocks, Time**  
Gisholt Machine Co., Madison, Wis.  
International Business Machines Co., Toronto, Ont.

**Clutches, Friction**  
Bernard Industrial Co., A., Forterville, Que.  
Can. Link-Belt Co., Toronto, Ont.  
Ford-Smith Machine Co., Hamilton, Ont.  
Johnson Machine Co., Carlyle, Manchester, Vt.  
Positive Clutch & Pulley Works, Toronto, Ont.

**Coal and Ash Handling Machinery**  
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.  
Can. Link-Belt Co., Toronto, Ont.  
Morris Crane & Holst Co., Ltd., Niagara Falls, Ont.

**Coal-Storage Systems**  
Can. Link-Belt Co., Toronto, Ont.

**Cocks and Faucets**  
Pure Sanitary Drinking Fountain Co., Haverhill, Mass.

**Collars, Shaft and Set**  
Canada Foundries & Forgings Co., Welland, Ont.  
Can. Link-Belt Co., Toronto, Ont.

**Collets**  
Ackworth, Ltd., John, Birmingham, Eng.  
Butterfield & Co., Inc., Rock Island, Que.  
Canada Machinery Corp., Galt, Ont.  
Hendley Machine Co., Torrington, Conn.  
Kearney & Trecker Co., Milwaukee, Wis.  
Petrie, Ltd., H. W., Toronto, Ont.  
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

**Compounds, Carburizing, Case Hardening and Tempering**  
Catacrat Refining Co., Toronto, Ont.

**Compounds, Cleaning**  
Can. Hanson & Van Winkle Co., Ltd., Toronto, Ont.  
Oakley Chemical Co., New York, N.Y.

**Compounds, Cutting, Drilling, Grinding, Saw Cutting**  
Atkins & Co., Inc., E. C., Indianapolis, I.  
Catacrat Refining Co., Toronto, Ont.  
Oakley Chemical Co., New York, N.Y.

**Compressors, Air**  
Curtis Pneumatic Machinery Co., St. Louis, Mo.

**Compressors, Air and Gas**  
Can. Fairbanks-Morse Co., Ltd., Montreal, Que.  
Ingersoll-Rand Co., Ltd., Sherbrooke, Que.  
Garlock-Walker Mch. Co., Toronto, Ont.

Holden Co., Ltd., Montreal, Que.  
Petrie, Ltd., H. W., Toronto, Ont.

**Cones, Friction**  
Norton Co. of Can., Ltd., Hamilton, Ont.

**Connecting Rods and Straps**  
Canada Foundries & Forgings Co., Welland, Ont.

**Contract Work**  
Ford-Smith Machine Co., Hamilton, Ont.  
Skinner Bros. Mfg. Co., Inc., St. Louis, Mo.

**Conveyors and Elevators (See Elevators)**  
Belmont & Glasco, Montreal, Que.  
Main Belting Co. of Can., Montreal, Que.  
Mathews Gravity Carrier Co., Port Hope, Ont.

**Conveyor Belt Joiners**  
Flexible Steel Lacing Co., Chicago, Ill.

**Copper**  
Brown's Copper & Brass Rolling Mills, Ltd., Toronto, Ont.

**Cored Bronze Bars**  
Tallman Brass & Metal, Ltd., Hamilton, Ont.

**Cotter Pins**  
Morrow Screw & Nut Co., Ltd., John, Ingersoll, Ont.

**Counters**  
Cleveland Twist Drill Co., Cleveland, O.  
Eclipse Counterscore Co., Ltd., Walkerville, Ont.  
Ingersoll Machine & Tool Co., Ltd., Ingersoll, Ont.  
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

**Counters, Revolution**  
Alkenhead Hardware Ltd., Toronto, Ont.  
Starrett Co., L. S., Athol, Mass.

**Counterhafts**  
Bertram & Son Co., Ltd., The John, Dundas, Ont.  
Canada Foundries & Forgings Co., Welland, Ont.  
Ford-Smith Machine Co., Hamilton, Ont.  
Johnson Machine Co., Carlyle, Manchester, Vt.  
Kearney & Trecker Co., Milwaukee, Wis.  
McDougall Co., Ltd., R., Galt, Ont.

**Countersinks**  
Butterfield & Co., Inc., Rock Island, Que.  
Eclipse Counterscore Co., Ltd., Walkerville, Ont.  
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

**Couplers, Car and Locomotive**  
Can. Steel Foundries, Montreal, Que.  
Dominion Foundries & Steel, Ltd., Hamilton, Ont.

**Couplings, Flexible**  
Holden Co., Ltd., Montreal, Que.

**Couplings, Rigid**  
Bernard Industrial Co., A., Forterville, Que.

**Couplings, Shaft**  
Hilton Machine Co., Bridgeport, Conn.  
Can. Link-Belt Co., Toronto, Ont.

**Cranes, Electric**  
Bertram & Son Co., Ltd., The John, Dundas, Ont.  
Can. Link-Belt Co., Toronto, Ont.  
Dominion Bridge Co., Ltd., Lachine, Que.  
Hepburn Ltd., John T., Toronto, Ont.  
Morris Crane & Holst Co., Ltd., Niagara Falls, Ont.  
Northern Crane Works, Walkerville, Ont.  
Shepard Electric Crane & Holst Co., Montour Falls, N.Y.

**Cranes, Hand (See Hoists, Hand)**  
Dominion Bridge Co., Ltd., Lachine, Que.  
Hepburn Ltd., John T., Toronto, Ont.  
Morris Crane & Holst Co., Ltd., Niagara Falls, Ont.  
Northern Crane Works, Walkerville, Ont.  
Shepard Electric Engineering Supplies, Ltd., Montreal, Que.

**Cranes, Locomotive**  
Can. Link-Belt Co., Toronto, Ont.  
Holden Co., Ltd., Montreal, Que.

**Cranes, Traveling**  
Bertram & Son Co., Ltd., The John, Dundas, Ont.  
Can. Link-Belt Co., Toronto, Ont.  
Dominion Bridge Co., Ltd., Lachine, Que.  
Hepburn Ltd., John T., Toronto, Ont.  
Morris Crane & Holst Co., Ltd., Niagara Falls, Ont.  
Northern Crane Works, Walkerville, Ont.

**Crank Pin Turning Machines**  
Garlock-Walker Mch. Co., Toronto, Ont.  
Hendley Machine Co., Torrington, Conn.  
Underwood Corp., H. B., Philadelphia, Pa.

**Cutters, Fine**  
Gold Co., Ltd., Montreal, Que.

**Cutters, Gear**  
Armstrong Whitworth Co. of Can., Ltd., Montreal, Que.  
Brown & Sharpe Mfg. Co., Providence, R.I.  
Butterfield & Co., Inc., Rock Island, Que.  
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

**Cutters, High Speed**  
Armstrong Whitworth Co. of Canada, Ltd., Montreal, Canada.

Atkins & Co., Inc., E. C., Indianapolis, I.  
Hilton Machine Co., Bridgeport, Conn.  
Butterfield & Co., Inc., Rock Island, Que.  
Bellows Co., Toronto, Ont.  
Ingersoll Machine & Tool Co., Ltd., Ingersoll, Ont.  
Kearney & Trecker Co., Milwaukee, Wis.  
Mathews Gravity Carrier Co., Port Hope, Ont.  
Pilot Steel & Tool Co., Montreal, Que.  
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

**Cutters, Milling**  
Armstrong-Whitworth of Canada, Ltd., Montreal, Canada.

**Cutters, Planer**  
Brown & Sharpe Mfg. Co., Providence, R.I.  
Butterfield & Co., Inc., Rock Island, Que.  
Can. Fairbanks-Morse Co., Ltd., Montreal, Que.  
Cleveland Milling Machine Co., Cleveland, Ohio.  
Ingersoll Machine & Tool Co., Ltd., Ingersoll, Ont.  
Kearney & Trecker Co., Milwaukee, Wis.  
Morse Twist Drill & Machine Co., New Bedford, Mass.  
Pilot Steel & Tool Co., Montreal, Que.

**Cutters, Stay Bolt**  
Acme Machinery Co., Cleveland, Ohio.  
Landis Machine Co., Inc., Waynesboro, Pa.  
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

**Cutters, Thread**  
Brown & Sharpe Mfg. Co., Providence, R.I.  
Greenfield Tap & Die Corp., Galt, Ont.  
Jones & Lamson Machine Co., Springfield, Vt.  
Landis Machine Co., Inc., Waynesboro, Pa.

**Cutting-Off Machines**  
Bertram & Son Co., Ltd., The John, Dundas, Ont.  
Brown & Sharpe Mfg. Co., Providence, R.I.  
Ema Machine Co., Toledo, Ohio.  
Hepburn Ltd., John T., Toronto, Ont.  
Greenfield Tap & Die Corp., Galt, Ont.  
Petrie, Ltd., H. W., Toronto, Ont.  
Starrett Co., L. S., Athol, Mass.

**Cutting-Off Machines, Pipe (See Pipe-Cutting and Threading Machines)**  
Landis Machine Co., Inc., Waynesboro, Pa.  
McDougall Co., Ltd., R., Galt, Ont.  
Wright Tool Corp. of Can., Ltd., Brantford, Ont.

**Cutting-Off Tools**  
Armstrong-Whitworth of Canada, Ltd., Montreal, Canada.

**Cutting, Oxy-Acetylene**  
Carter Welding Co., Toronto, Ont.  
Holden Co., Ltd., Montreal, Que.  
Perdue, W. B., San Francisco, Calif.  
Prest-O-Lite Co. of Can., Toronto, Ont.  
Turner Bros. Welding, Brampton, Ill.

**Cutting Oil Filters (See Oil Filtering Systems)**  
Bowers, V. F., & Co., Ltd., Toronto, Can.  
Catacrat Refining Co., Toronto, Ont.

**Cutting, Oxy-Acetylene**  
Carter Welding Co., Toronto, Ont.  
Holden Co., Ltd., Montreal, Que.  
Perdue, W. B., San Francisco, Calif.  
Prest-O-Lite Co. of Can., Toronto, Ont.  
Turner Bros. Welding, Brampton, Ill.

**Cutting, Oxy-Hydrogen**  
National Electro Products, Ltd., Toronto, Ont.

**Dealers, Machinery (See Searchlight Section)**  
Ford-Smith Machine Co., Hamilton, Ont.  
Petrie, Ltd., H. W., Toronto, Ont.

**Deckle Straps**  
Consolidated Rubber Co., Ltd., Montreal, Que.

**Diamonds, Black and Rough**  
Joyce-Koebel Co., Inc., New York, N.Y.

**Diamond, Carbon and Bortz**  
Joyce-Koebel Co., Inc., New York, N.Y.

**Diamond Tools**  
Alkenhead Hardware Ltd., Toronto, Ont.  
Can. Desmond-Stephan Co., Hamilton, Ont.

**Diamonds, Grinding**  
Ford-Smith Machine Co., Hamilton, Ont.  
Wheel Truing Tool Co., Detroit, Mich.

**Diamond Crossings**  
Can. Steel Foundries, Montreal, Que.

**Die-Castings**  
Tallman Brass & Metal, Ltd., Hamilton, Ont.

**Dies, Pipe-Threading**  
Jones & Lamson Machine Co., Springfield, Vt.

**Dies, Sink**  
Hillier, St. Catharines, Ont.

**Dies, Sink**  
Hillier, St. Catharines, Ont.

**Dies, Sink**  
Hillier, St. Catharines, Ont.

**Dies, Sink**  
Hillier, St. Catharines, Ont.

**Dies, Sink**  
Hillier, St. Catharines, Ont.

**Dies, Sink**  
Hillier, St. Catharines, Ont.

**Dies, Sink**  
Hillier, St. Catharines, Ont.

**Dies, Sink**  
Hillier, St. Catharines, Ont.

**Dies, Sink**  
Hillier, St. Catharines, Ont.

**Dies, Sink**  
Hillier, St. Catharines, Ont.

**Dies, Sink**  
Hillier, St. Catharines, Ont.

**Dies, Sink**  
Hillier, St. Catharines, Ont.

**Dies, Sink**  
Hillier, St. Catharines, Ont.

**Dies, Sink**  
Hillier, St. Catharines, Ont.

**Dies, Sink**  
Hillier, St. Catharines, Ont.

**Dies, Sink**  
Hillier, St. Catharines, Ont.

**Dies, Sink**  
Hillier, St. Catharines, Ont.

**Dies, Sink**  
Hillier, St. Catharines, Ont.

**Dies, Sink**  
Hillier, St. Catharines, Ont.

**Dies, Sink**  
Hillier, St. Catharines, Ont.

**Dies, Sink**  
Hillier, St. Catharines, Ont.

**Dies, Sink**  
Hillier, St. Catharines, Ont.

**Dies, Sink**  
Hillier, St. Catharines, Ont.

**Dies, Sink**  
Hillier, St. Catharines, Ont.

**Dies, Sink**  
Hillier, St. Catharines, Ont.

**Dies, Sink**  
Hillier, St. Catharines, Ont.

**Dies, Sink**  
Hillier, St. Catharines, Ont.

**Dies, Sink**  
Hillier, St. Catharines, Ont.

**Dies, Sink**  
Hillier, St. Catharines, Ont.

**Dies, Sink**  
Hillier, St. Catharines, Ont.

**Dies, Sink**  
Hillier, St. Catharines, Ont.

**Dies, Sink**  
Hillier, St. Catharines, Ont.

**Dies, Sink**  
Hillier, St. Catharines, Ont.

**Dies, Sink**  
Hillier, St. Catharines, Ont.

**Dies, Sink**  
Hillier, St. Catharines, Ont.

**Dies, Sink**  
Hillier, St. Catharines, Ont.

**Dies, Sink**  
Hillier, St. Catharines, Ont.

**Dies, Sink**  
Hillier, St. Catharines, Ont.

# BUYERS' DIRECTORY

Williams Machinery & Supply Co., A  
Montreal Que.



© 2004 Blackwell Publishing Ltd *Journal of Internal Medicine* 255: 105–112

# MANUFACTURERS DIRECTORY

**Jigs and Fixtures (See Tool Work)**  
 Fiat Motor Co. Ltd., Orillia, Ont.  
 Ford-Smith Machine Co., Hamilton, Ont.  
 Gisholt Machine Co., Madison, Wis.  
 Hamilton Engineering Service, Ltd.,  
 Hamilton, Ont.  
 Rapid Tool & Machine Co., Lachine, Que.

**Keyseating Machines**  
 Bilton Machine Co., Bridgeport, Conn.  
 Garlock-Walker Mch. Co., Toronto, Ont.  
 Morton Mfg. Co., Muskegon, Mich.  
 Petrie, Ltd., H. W., Toronto, Ont.  
 Pratt & Whitney Co. of Canada, Ltd.,  
 Dundas, Ont.

**Keys, Machine**  
 Can. Drawn Steel Co., Hamilton, Ont.  
 Can. Fairbanks-Morse Co., Toronto, Ont.  
 Morton Mfg. Co., Muskegon, Mich.

**Knives, Machine**  
 Atkins & Co., Inc., E. C., Indianapolis, I.  
 Canada Machinery Corp., Galt, Ont.  
 Can. Steel Mills Co., Grand Rapids, Mich.  
 Simons Canada Saw Co., Montreal, Que.

**Knurl Holders**  
 Pratt & Whitney Co. of Canada, Ltd.,  
 Dundas, Ont.

**Lacing Leather**  
 Clipper Belt Lacer Co., Grand Rapids, Mich.  
 Main Belting Co. of Can., Montreal, Que.

**Lamps, Electric**  
 Federal Engr'g Co., Ltd., Toronto, Ont.  
 Northern Electric Co., Montreal, Que.

**Lathe Attachments**  
 Canada Machinery Corp., Galt, Ont.  
 Hender Machine Co., Torrington, Conn.  
 Lehmann Machine Co., St. Louis, Mo.  
 Petrie, Ltd., H. W., Toronto, Ont.

**Lathe Pans, Portable**  
 Canada Machinery Corp., Galt, Ont.

**Lathe Tools**  
 Can. Atlas Crucible Steel Co., Chicago, Ill.  
 Can. Atlas Crucible Steel Co., Ltd.,  
 Toronto, Ont.

**Lathe Machine Co., Madison, Wis.**  
 Hender Machine Co., Torrington, Conn.  
 Lehmann Machine Co., St. Louis, Mo.  
 Petrie, Ltd., H. W., Toronto, Ont.

**Lathe, Automatic and Semi-Automatic**  
 Armstrong-Whitworth of Canada, Ltd.,  
 London, Canada.  
 Gisholt Machine Co., Madison, Wis.  
 Herbert Ltd., Alfred, Toronto, Ont.  
 Jones & Lamson Machine Co., Springfield,  
 Vt.

**Lathe, Bench**  
 Archibald & Co., Chas. F., Montreal, Q.  
 Pratt & Whitney Co. of Canada, Ltd.,  
 Dundas, Ont.

**Lathe, Boring**  
 Bertram & Son Co., Ltd., The John,  
 Dundas, Ont.  
 Canada Machinery Corp., Galt, Ont.  
 Steine Turret Machine Co., Madison, Wis.

**Lathe, Chucking (See Lathes, Vertical Turret, and Lathes, Vertical Turret)**  
 Acme Machine Tool Co., Cincinnati, Ohio.  
 Bertram & Son Co., Ltd., The John,  
 Dundas, Ont.

**Lathe Machine Co., Madison, Wis.**  
 Hender Machine Co., Torrington, Conn.  
 Lehmann Machine Co., St. Louis, Mo.  
 McDougall Co., Ltd., R. Galt, Ont.  
 Steine Turret Machine Co., Madison, Wis.  
 Warner & Swasey Co., Cleveland, Ohio.

**Lathe, Engine**  
 Archibald & Co., Chas. F., Montreal, Q.  
 Bertram & Son Co., Ltd., The John,  
 Dundas, Ont.

**Lathe Machine Corp., Galt, Ont.**  
 Can. Fairbanks-Morse Co., Ltd., Montreal.  
 Gisholt Machine Co., Madison, Wis.  
 Jones & Lamson Machine Co., Springfield,  
 Vt.

**Lathe Machine Co., Springfield, Vt.**  
 McDougall Co., Ltd., R. Galt, Ont.  
 Steine Turret Machine Co., Madison, Wis.  
 Warner & Swasey Co., Cleveland, Ohio.

**Lathe Machine Co., Madison, Wis.**  
 Hender Machine Co., Torrington, Conn.  
 Lehmann Machine Co., St. Louis, Mo.  
 McDougall Co., Ltd., R. Galt, Ont.  
 Steine Turret Machine Co., Madison, Wis.  
 Warner & Swasey Co., Cleveland, Ohio.

**Lathe Machine Co., Springfield, Vt.**  
 McDougall Co., Ltd., R. Galt, Ont.  
 Steine Turret Machine Co., Madison, Wis.  
 Warner & Swasey Co., Cleveland, Ohio.

**Lathe Machine Co., Springfield, Vt.**  
 McDougall Co., Ltd., R. Galt, Ont.  
 Steine Turret Machine Co., Madison, Wis.  
 Warner & Swasey Co., Cleveland, Ohio.

**Lathe Machine Co., Springfield, Vt.**  
 McDougall Co., Ltd., R. Galt, Ont.  
 Steine Turret Machine Co., Madison, Wis.  
 Warner & Swasey Co., Cleveland, Ohio.

**Lathe Machine Co., Springfield, Vt.**  
 McDougall Co., Ltd., R. Galt, Ont.  
 Steine Turret Machine Co., Madison, Wis.  
 Warner & Swasey Co., Cleveland, Ohio.

**Lathe Machine Co., Springfield, Vt.**  
 McDougall Co., Ltd., R. Galt, Ont.  
 Steine Turret Machine Co., Madison, Wis.  
 Warner & Swasey Co., Cleveland, Ohio.

**Lathe Machine Co., Springfield, Vt.**  
 McDougall Co., Ltd., R. Galt, Ont.  
 Steine Turret Machine Co., Madison, Wis.  
 Warner & Swasey Co., Cleveland, Ohio.

**Lathe Machine Co., Springfield, Vt.**  
 McDougall Co., Ltd., R. Galt, Ont.  
 Steine Turret Machine Co., Madison, Wis.  
 Warner & Swasey Co., Cleveland, Ohio.

**Lathe Machine Co., Springfield, Vt.**  
 McDougall Co., Ltd., R. Galt, Ont.  
 Steine Turret Machine Co., Madison, Wis.  
 Warner & Swasey Co., Cleveland, Ohio.

**Lathe Machine Co., Springfield, Vt.**  
 McDougall Co., Ltd., R. Galt, Ont.  
 Steine Turret Machine Co., Madison, Wis.  
 Warner & Swasey Co., Cleveland, Ohio.

Williams Machinery & Supply Co., A. R.,  
 Montreal, Que.

**Lathes, Horizontal Turret**  
 Acme Machine Tool Co., Cincinnati, Ohio.  
 Blount Co., J. G., Everett, Mass.  
 Gisholt Machine Co., Madison, Wis.  
 Herbert Ltd., Alfred, Toronto, Ont.  
 Jones & Lamson Machine Co., Springfield,  
 Vt.

**Lathes, Horizontal Turret**  
 McDougall Co., Ltd., R. Galt, Ont.  
 National Acme Co., Cleveland, Ohio.  
 Oliver Machinery Co., Grand Rapids, Mich.  
 Petrie, Ltd., H. W., Toronto, Ont.  
 Rockford Lathe & Drill Co., Rockford,  
 Ill.

**Lathes, Horizontal Turret**  
 Steine Turret Machine Co., Madison, Wis.  
 Warner & Swasey Co., Cleveland, Ohio.

**Lathes, Polishing (See Polishing and Buffing Machines)**  
 Ford-Smith Machine Co., Hamilton, Ont.

**Lathes, Reliving**  
 Canada Machinery Corp., Galt, Ont.  
 Hender Machine Co., Torrington, Conn.  
 McDougall Co., Ltd., R. Galt, Ont.

**Lathe, Universal Hand**  
 Brown & Sharpe Mfg. Co., Providence, R.I.

**Lathes, Screw-Cutting**  
 Jones & Lamson Machine Co., Springfield,  
 Vt.

**Lathe, Speed and Hand**  
 Blount Co., J. G., Everett, Mass.  
 Garlock-Walker Mch. Co., Toronto, Ont.  
 Greenfield Tap & Die Corp., Galt, Ont.  
 Oliver Machinery Co., Grand Rapids, Mich.

**Lathes, Spinning**  
 Terry & Co., John C., Birmingham, Eng.

**Lathes, Threading**  
 Canada Machinery Corp., Galt, Ont.  
 Greenfield Tap & Die Corp., Galt, Ont.  
 Hender Machine Co., Torrington, Conn.  
 Lehmann Machine Co., St. Louis, Mo.

**Lathes, Vertical Turret**  
 Bertram & Son Co., Ltd., The John,  
 Dundas, Ont.

**Lathes, Vertical Turret**  
 Gisholt Machine Co., Madison, Wis.  
 Jones & Lamson Machine Co., Springfield,  
 Vt.

**Lathes, Wood Turning**  
 Blount Co., J. G., Everett, Mass.  
 Can. Fairbanks-Morse Co., Ltd., Montreal.  
 Garlock-Walker Mch. Co., Toronto, Ont.  
 Oliver Machinery Co., Grand Rapids, Mich.  
 Petrie, Ltd., H. W., Toronto, Ont.

**Lead Pipe**  
 Steel Co. of Canada, Ltd., Hamilton, Ont.

**Lighting Fixtures**  
 Northern Electric Co., Montreal, Que.  
 Talman Brass & Metal Co., Hamilton, Ont.

**Linoleum Mill Machinery**  
 Bertrams Ltd., Edinburgh, Scotland.

**Liquid Air Plants**  
 L'Air Liquide, Ltd., Toronto, Ont.

**Lockers, Clothes**  
 Can. Foamite Fireproof Co., Hamilton, Ont.

**Lubricants**  
 Cateract Refining Co., Toronto, Ont.  
 Oakley Chemical Co., New York, N.Y.

**Lubricating Systems**  
 Bowser, S. F. & Co., Ltd., Toronto, Can.

**Machinists' Small Tools**  
 Armstrong-Whitworth of Canada, Ltd.,  
 Montreal, Canada.

**Machinists' Small Tools**  
 Bertrams Ltd., Edinburgh, Scotland.  
 Brown & Sharpe Mfg. Co., Providence, R.I.  
 Can. Fairbanks-Morse Co., Ltd., Montreal.  
 Canada Foundries & Forgings Co., Wel-  
 land, Ont.

**Machinists' Small Tools**  
 Can. Fairbanks-Morse Ltd., Montreal, Q.  
 Dodge Mfg. Co. of Can., Toronto, Ont.  
 Foss Machinery & Supply Co., Geo. F.,  
 Montreal, Que.

**Machinists' Small Tools**  
 Ker & Goodwin Machine Co., Brantford,  
 Ont.

**Machinists' Small Tools**  
 Petrie, Ltd., H. W., Toronto, Ont.  
 Pilot Steel & Tool Co., Montreal, Que.  
 Pratt & Whitney Co., of Canada, Ltd.,  
 Dundas, Ont.

**Machinists' Small Tools**  
 Rapid Tool & Machine Co., Lachine, Que.  
 Rice Lewis & Co., Ltd., Toronto, Ont.  
 Rockford Milling Machine Co., Rockford,  
 Ill.

**Machinists' Small Tools**  
 Sturtevant Co., L. S., Athol, Mass.  
 Sverin Co. of Can., Ltd., Chas. A.,  
 Windsor, Ont.

**Machinists' Small Tools**  
 Wheel Truening Tool Co., Detroit, Mich.  
 Williams Machinery Co., A. R., Toronto,  
 Ont.

**Machinists' Small Tools**  
 Williams Machinery & Supply Co., A. R.,  
 Montreal, Que.

**Measuring Machines**  
 Pratt & Whitney Co. of Canada, Ltd.,  
 Dundas, Ont.

**Metals, Alloy**  
 British Smelting & Refining Co., Ltd.,  
 Montreal, Que.

**Metals, Alloy**  
 Brown's Copper & Brass Rolling Mills,  
 Ltd., Toronto, Ont.

**Metals, Alloy**  
 Can. Steel Mills Co., Ltd., Toronto, Ont.  
 Can. Atlas Crucible Steel Co., Ltd.,  
 Toronto, Ont.

**Metals, Alloy**  
 Can. Steel Foundries, Montreal, Que.  
 Deloro Smelting & Refining Co., Ltd.,  
 Toronto, Ont.

**Metals, Alloy**  
 Fiat Motor Co., Ltd., Orillia, Ont.  
 Hoyt Metal Co., Toronto, Ont.

**Metals, Alloy**  
 International Nickel Co. of Can., Ltd.,  
 Toronto, Ont.

**Metals, Alloy**  
 Magnolia Metal Co., Montreal, Que.  
 Moore & Son, Thos., Montreal, Que.  
 Pilot Steel & Tool Co., Montreal, Que.  
 Talman Brass & Metal, Ltd., Hamil-  
 ton, Ontario.

**Metals, Alloy**  
 Walker & Sons Metal Products, Ltd.,  
 Hiram, Walkerville, Ont.

**Metalite Cloth**  
 Ritchey Supply Co., Toronto, Ont.

**Micrometer Calipers**  
 Alkenhead Hardware Ltd., Toronto, Ont.  
 Brown & Sharpe Mfg. Co., Providence, R.I.  
 Rice Lewis & Son, Ltd., Toronto, Ont.

**Milling Attachments**  
 Ackworth, Ltd., John, Birmingham, Eng.  
 Cincinnati Milling Machine Co., Cincin-  
 nati, Ohio.

**Milling Attachments**  
 Ford-Smith Machine Co., Hamilton, Ont.  
 Hender Machine Co., Torrington, Conn.  
 Kearney & Trecker Co., Milwaukee, Wis.  
 Petrie, Ltd., H. W., Toronto, Ont.

**Milling Machines**  
 Brown & Sharpe Mfg. Co., Providence, R.I.  
 Can. Fairbanks-Morse Co., Ltd., Montreal.

**Milling Machines, Automatic**  
 Bilton Machine Co., Bridgeport, Conn.  
 Cincinnati Milling Machine Co., Cincin-  
 nati, Ohio.

**Milling Machines, Automatic**  
 Pratt & Whitney Co. of Canada, Ltd.,  
 Dundas, Ont.

**Milling Machines, Automatic**  
 Terry & Co., John C., Birmingham, Eng.

**Milling Machines, Bench**  
 Burke Machine Tool Co., Connaut, Ohio.  
 Garlock-Walker Mch. Co., Toronto, Ont.  
 Rockford Milling Machine Co., Rockford,  
 Ill.

**Milling Machines, Bench**  
 Terry & Co., John C., Birmingham, Eng.

**Milling Machines, Hand**  
 Burke Machine Tool Co., Connaut, Ohio.  
 Pratt & Whitney Co. of Canada, Ltd.,  
 Dundas, Ont.

**Milling Machines, Hand**  
 Rockford Milling Machine Co., Rockford,  
 Ill.

**Milling Machines, Hand**  
 Terry & Co., John C., Birmingham, Eng.  
 United States Machine Tool Co., Cin-  
 cinnati, Ohio.

**Milling Machines, Horizontal and Planer Type**  
 Bertram & Son Co., Ltd., The John,  
 Dundas, Ont.

**Milling Machines, Horizontal and Planer Type**  
 Can. Fairbanks-Morse Ltd., Montreal, Q.  
 Cleveland Milling Machine Co., Cleveland,  
 Ford-Smith Machine Co., Hamilton, Ont.  
 Gouley Edlund Inc., Cortland, N.Y.

**Milling Machines, Horizontal and Planer Type**  
 Herbert Ltd., Alfred, Toronto, Ont.  
 Kearney & Trecker Co., Milwaukee, Wis.  
 Rockford Milling Machine Co., Rockford,  
 Ill.

**Milling Machines, Horizontal and Planer Type**  
 Rockford Milling Machine Co., Rockford,  
 Ill.

**Milling Machines, Horizontal and Planer Type**  
 Rockford Milling Machine Co., Rockford,  
 Ill.

**Milling Machines, Horizontal and Planer Type**  
 Rockford Milling Machine Co., Rockford,  
 Ill.

**Milling Machines, Horizontal and Planer Type**  
 Rockford Milling Machine Co., Rockford,  
 Ill.

**Milling Machines, Horizontal and Planer Type**  
 Rockford Milling Machine Co., Rockford,  
 Ill.

**Roelofson Machine & Tool Co., Toronto, Ont.**  
 Williams Machinery & Supply Co., A. R.,  
 Montreal, Que.

**Milling Machines, Vertical**  
 Cincinnati Milling Machine Co., Cincin-  
 nati, Ohio.

**Milling Machines, Vertical**  
 Garlock-Walker Mch. Co., Toronto, Ont.  
 Herbert Ltd., Alfred, Toronto, Ont.  
 Kearney & Trecker Co., Milwaukee, Wis.  
 Kampsmit Mfg. Co., Milwaukee, Wis.  
 Rockford Milling Machine Co., Rockford,  
 Ill.

**Milling Machines, Vertical**  
 Williams Machinery Co., A. R., Toronto,  
 Ont.

**Monel Metal**  
 International Nickel Co. of Can., Ltd.,  
 Toronto, Ont.

**Motors, Electric**  
 Atkins & Co., Inc., E. C., Indianapolis, I.  
 Can. Fairbanks-Morse Co., Ltd., Montreal.  
 Garlock-Walker Mch. Co., Toronto, Ont.  
 MacGorm & Co., Montreal, Que.  
 Northern Electric Co., Montreal, Que.  
 Petrie, Ltd., H. W., Toronto, Ont.  
 Sturtevant Co., B. F., Boston, Mass.  
 Williams Machinery Co., A. R., Toronto,  
 Ont.

**Motors, Electric**  
 Wisconsin Electric Co., Racine, Wis.

**Moulded Rubber Goods**  
 Can. Consolidated Rubber Co., Ltd.,  
 Montreal, Que.

**Nail Machinery**  
 Sleeper & Hartley, Inc., Worcester, Mass.

**Nails and Staples**  
 Steel Co. of Canada, Ltd., Hamilton, Ont.  
 Nickel, Bars, Sheets, Wire, Etc.  
 International Nickel Co. of Can., Ltd.,  
 Toronto, Ont.

**Nickel Plating Outlets**  
 Walker & Sons Metal Products, Ltd.,  
 Hiram, Walkerville, Ont.

**Nickel Silver**  
 Brown's Copper & Brass Rolling Mills,  
 Ltd., Toronto, Ont.

**Nitrogen**  
 L'Air Liquide Society, Toronto, Ont.

**Nut Tappers (See Bolt and Nut Machinery)**  
 Acme Machinery Co., Cleveland, Ohio.  
 Bertram & Son Co., Ltd., The John,  
 Dundas, Ont.

**Nut Tappers (See Bolt and Nut Machinery)**  
 Can. Fairbanks-Morse Co., Ltd., Montreal.  
 Greenfield Tap & Die Corp., Galt, Ont.  
 National Acme Co., Cleveland, Ohio.

**Nuts, Finished and Semi-Finished**  
 Galt Machine Screw Co., Galt, Ont.

**Nuts, Machine Screw**  
 Torrington Company, Ltd., Upper Bed-  
 ford.

**Nuts, S.A.E., Plain and Castellated**  
 Galt Machine Screw Co., Galt, Ont.

**Oil Cocks and Burners**  
 Pure Sanitary Drinking Fountain Co.,  
 Haydensville, Mass.

**Oil Filtering and Storage Systems**  
 Bowser, S. F. & Co., Ltd., Toronto, Can.

**Oil Storage Engineers**  
 Bowser, S. F. & Co., Ltd., Toronto, Can.

**Oils**  
 Canadian Oil Companies, Ltd., Toronto,  
 Ont.

**Oils**  
 Cateract Refining Co., Toronto, Ont.  
 Imperial Oil Ltd., Toronto, Ont.

**Oil Hole Covers**  
 Can. Winkley Co., Ltd., Windsor, Ont.

**Oils, Soluble**  
 Cateract Refining Co., Toronto, Ont.  
 Imperial Oil Ltd., Toronto, Ont.

**Oxygen**  
 Carter Welding Co., Toronto, Ont.  
 Dominion Oxygen Co., Toronto, Ont.  
 L'Air Liquide Society, Toronto, Ont.

**Oxy-Acetylene Apparatus**  
 L'Air Liquide Society, Toronto, Ont.

**Packing, Hydraulic**  
 Can. Consolidated Rubber Co., Ltd.,  
 Montreal, Que.

**Packing, Hydraulic**  
 Graton & Knight Mfg. Co., Worcester,  
 Mass.

**Packing, Steam**  
 Can. Consolidated Rubber Co., Ltd.,  
 Montreal, Que.

**Packing, Steam**  
 Can. Fairbanks-Morse Co., Ltd., Montreal.  
 Graton & Knight Mfg. Co., Worcester,  
 Mass.

**Paper Mill Conveyors**  
 Bertrams Ltd., Edinburgh, Scotland.

**Patents**  
 Fetherhaugh & Co., Ottawa, Ont.  
 Marion & Marion, Montreal, Que.

**Pans, Wet and Dry**  
 Frost Mfg. Co., Chicago, Ill.

**Pattern-Shop Machinery (See Wood-working Machinery)**  
 Canada Machine Corp., Galt, Ont.  
 Oliver Machinery Co., Grand Rapids, Mich.

**Patterns, Wood and Metal**  
 Crescent Machine Co., Ltd., Montreal, Q.  
 Vinton Foundry Co., Ltd., Ottawa, Ont.  
 Wraggs Pattern Works, Galt, Ont.

**Penstocks, Steel**  
 MacKinnon Steel Co., Sherbrooke, Que.



# BUYERS' DIRECTORY

**Phosphor Tin**  
British Smelting & Refining Co., Ltd.,  
Montreal, Que.

**Photographic Duplicating Machines**  
Commercial Camera Co., Providence, R.I.

**Pig Iron**  
Steel Co. of Canada, Ltd., Hamilton, Ont.

**Pipe Bending Machines**  
American Pipe Bending Machine Co.,  
Boston, Mass.

Can. Fairbanks-Morse Co., Ltd., Montreal.  
Underwood Corp., H. B., Philadelphia,  
Pa.  
Williams Machinery Co., A. R., Toronto,  
Ont.

**Pipe Couplings**  
Steel Co. of Canada, Ltd., Hamilton, Ont.

**Pipe Cutting and Threading Machines**  
Can. Fairbanks-Morse Co., Ltd., Montreal.

Crane Ltd., Montreal, Que.  
Greenfield Tap & Die Corp., Galt, Ont.  
Jardine & Co., A. B., Hespeler, Ont.  
Lands Machine Co., Inc., Weynesboro, Pa.  
Murchey Machine & Tool Co., Detroit,  
Mich.

McDougall Co., Ltd., R., Galt, Ont.  
Petrie, Ltd., H. W., Toronto, Ont.  
Williams Tool Corp. of Can., Ltd., Brantford,  
Ont.

**Pipe and Nipple Threading Machines**  
Lands Machine Co., Inc., Weynesboro, Pa.

**Pipe Fitters' Tools**  
Aikenhead Hardware Ltd., Toronto, Ont.

Crane Ltd., Montreal, Que.  
Rice Lewis & Son, Ltd., Toronto, Ont.

**Pipe Threading Die Heads**  
Lands Machine Co., Inc., Weynesboro, Pa.

**Plaston-Ring Machines**  
National Acme Co., Cleveland, Ohio.

Reidie Turst Machine Co., Madison, Wis.

**Planers, Parallel**  
L. & P. Mfg. Co., Niagara Falls, Ont.

**Planing Machines**  
Bertram & Son Co., Ltd., The John,  
Dundas, Ont.

Canada Machinery Corp., Galt, Ont.  
Can. Fairbanks-Morse Co., Ltd., Montreal.

Foss Machinery & Supply Co., Geo. F.,  
Montreal, Que.

Garlock-Walker Mch. Co., Toronto, Ont.

Heppburn Ltd., John T., Toronto, Ont.

Herbert Ltd., Albert, Toronto, Ont.

L. & P. Mfg. Co., Niagara Falls, Ont.

Morton Mfg. Co., Muskegon, Mich.

Oliver Machinery Co., Grand Rapids, Mich.

Williams Machinery Co., A. R., Toronto,  
Ont.

**Planing Machines, Rotary**  
Bertram & Son Co., Ltd., The John,  
Dundas, Ont.

**Plate Rolls**  
Canada Machinery Corp., Galt, Ont.

Bertram & Son Co., Ltd., The John,  
Dundas, Ont.

**Plumbers' Brass Goods**  
Paul Sauter & Son, Woking Fountain Co.,  
Haydensville, Mass.

**Pneumatic Tools**  
Can. Ingersoll-Rand Co., Ltd., Sherbrooke,  
Que.

Cleveland Pneumatic Tool Co., Toronto,  
Ont.

Garlock-Walker Mch. Co., Toronto, Ont.

Holden Co., Ltd., Montreal, Que.

Independent Pneumatic Tool, Chicago, Ill.

Keller Pneumatic Tool Co., Grand  
Haven, Mich.

**Polishing and Buffing Machines**  
Ackworth, Ltd., John, Birmingham, Eng.

American Pulley Co., Philadelphia, Pa.

Flaher Motor Co., Ltd., Orillia, Ont.

**Presses, Arbor**  
Atlas Press Co., Kalamazoo, Mich.

Can. Fairbanks-Morse Co., Ltd., Montreal.

L. & P. Manufacturing Company, Ltd.,  
Niagara Falls, Ont.

National Engineering Co., Sarnia, Ont.

Petrie, Ltd., H. W., Toronto, Ont.

Strattinger Co., Can., Ltd., Chas. A.,  
Windsor, Ont.

**Presses, Drop and Forging**  
Brown, Boggs & Co., Ltd., Hamilton, Ont.

Canada Foundries & Forging Co., Wel-  
land, Ont.

Can. Fairbanks-Morse Co., Ltd., Montreal.

Toledo Machine & Tool Co., Toledo, Ohio.

**Presses, Foot and Hand**  
Brown, Boggs & Co., Ltd., Hamilton, Ont.

Terry & Co., John C., Birmingham, Eng.

**Presses, Forcing**  
Atlas Press Co., Kalamazoo, Mich.

Stewart & Co., Duncan, Glasgow, Scot.

**Presses, Power**  
Bliss Co., E. W., Brooklyn, N.Y.  
Brown, Boggs & Co., Ltd., Hamilton, Ont.

Canada Machinery Corp., Galt, Ont.

Garlock-Walker Mch. Co., Toronto, Ont.

Heppburn Ltd., John T., Toronto, Ont.

Henry & Wright, H. C., Hartford, Conn.

Petrie, Ltd., H. W., Toronto, Ont.

Stall Co., Inc., D. H., Buffalo, N.Y.

Toledo Machine & Tool Co., Toledo, Ohio.

**Presses, Screw**  
Brown, Boggs & Co., Ltd., Hamilton, Ont.

Petrie, Ltd., H. W., Toronto, Ont.

**Profiling Machines**  
Aikenhead Hardware Ltd., Toronto, Ont.

Garlock-Walker Mch. Co., Toronto, Ont.

Pratt & Whitney Co., of Canada, Ltd.,  
Dundas, Ont.

**Protractors**  
Brown & Sharpe Mfg. Co., Providence, R.I.

**Propellers**  
Kennedy & Sons, Wm., Owen Sound, Ont.

**Pulleys, Cork Insert**  
American Pulley Co., Philadelphia, Pa.

Foss Machinery & Supply Co., Geo. F.,  
Montreal, Que.

Positive Clutch & Pulley Works, Toronto,  
Ont.

**Pulleys, Metal and Fibre**  
American Pulley Co., Philadelphia, Pa.

Canadian SKF Co., Toronto, Ont.

Diamond State Fibre Co. of Can., Ltd.,  
Toronto, Ont.

Johnson Machine Co., Carlyle, Manches-  
ter, Conn.

Kennedy & Sons, Wm., Owen Sound, Ont.

Williams Machinery & Supply Co., A. E.,  
Montreal, Que.

**Pulp and Paper Mill Equipment**  
MacKinnon Steel Co., Sherbrooke, Que.

**Pumps, Automobile Tire**  
Tallman Brass & Metal, Ltd., Hamilton,  
Ont.

**Pumps, Barrel and Boiler-fed**  
Trahern Pump Co., Rockford, Ill.

**Pumps, Circulating and Coolant**  
Trahern Pump Co., Rockford, Ill.

**Pumps, Geared and Hand**  
Trahern Pump Co., Rockford, Ill.

**Pumps, Industrial**  
Trahern Pump Co., Rockford, Ill.

**Pumps, Hydraulic**  
Can. T. Winkler & Sons Co., Ltd., Montreal

Can. Ingersoll-Rand Co., Ltd., Sherbrooke

Que. Electric Steel & Engineering Co., Wel-  
land, Ont.

Heppburn Ltd., John T., Toronto, Ont.

Holden Co., Ltd., Montreal, Que.

Stewart & Co., Duncan, Glasgow, Scot.

Trahern Pump Co., Rockford, Ill.

**Pumps, Lubricant and Oil**  
Bowler, S. F. & Co., Ltd., Toronto, Can.

Can. Flower & Forze Co., Ltd., Kitchener.

Heppburn Ltd., John T., Toronto, Ont.

McDougall Co., Ltd., R., Galt, Ont.

Trahern Pump Co., Rockford, Ill.

**Pumps, Power**  
Bowler, S. F. & Co., Ltd., Toronto, Can.

Can. Flower & Forze Co., Ltd., Kitchener.

Heppburn Ltd., John T., Toronto, Ont.

Can. Ingersoll-Rand Co., Ltd., Sher-  
brooke, Que.

Heppburn Ltd., John T., Toronto, Ont.

Trahern Pump Co., Rockford, Ill.

**Punches, Center**  
Brown & Sharpe Mfg. Co., Providence, R.I.

Pratt & Whitney Co., of Canada, Ltd.,  
Dundas, Ont.

Starrett Co., L. S., Alh., Mass.

**Punches, Hand**  
Brown, Boggs & Co., Ltd., Hamilton, Ont.

Can. Flower & Forze Co., Ltd., Kitchener.

Jardine & Co., A. B., Hespeler, Ont.

**Punches, Power**  
Brown, Boggs & Co., Ltd., Hamilton, Ont.

Canada Machinery Corp., Galt, Ont.

Can. Flower & Forze Co., Ltd., Kitchener.

Garlock-Walker Mch. Co., Toronto, Ont.

Petrie, Ltd., H. W., Toronto, Ont.

Toledo Machine & Tool Co., Toledo, Ohio.

**Punching Machines, Horizontal**  
Bertrams Ltd., Edinburgh, Scotland.

**Pyrometers, Electric**  
Bristol Co., Waterbury, Conn.

General Combustion Co. of Can., Ltd.,  
Montreal, Que.

Walker & Sons Metal Products, Ltd.,  
Hiram, Walkerville, Ont.

**Racks, Cut**  
Ford-Smith Machine Co., Hamilton, Ont.

Hamilton Gear & Machine Co., Toronto,  
Ont.

**Racks, Storage (See Furniture,  
Machine Shop)**  
Brantford Oven & Rack Co., Brantford,  
Ont.

**Rammers, Foundry**  
Holden Co., Ltd., Montreal, Que.

**Rammers, Holders**  
Cleveland Twist Drill Co., Cleveland, O.

Gisholt Machine Co., Madison, Wis.

Victor Tool Co., Weynesboro, Pa.

**Reamers, Expanding**  
Aikenhead Hardware Ltd., Toronto, Ont.

Can. Detroit Twist Drill Co., Walker-  
ville, Ont.

Cleveland Twist Drill Co., Cleveland, O.

Gisholt Machine Co., Madison, Wis.

Greenfield Tap & Die Corp., Galt, Ont.

Ingersoll Machine & Tool Co., Ltd.,  
Ingersoll, Ont.

McCroskey Tool Corp., Medford, Pa.

Pratt & Whitney Co., of Canada, Ltd.,  
Dundas, Ont.

**Reamers, Solid**  
Armstrong Whitworth Co. of Can., Ltd.,  
Montreal, Que.

Butterfield & Co., Inc., Rock Island, Que.

Can. Detroit Twist Drill Co., Walker-  
ville, Ont.

Cleveland Twist Drill Co., Cleveland, O.

Foss Machinery & Supply Co., Geo. F.,  
Montreal, Que.

Greenfield Tap & Die Corp., Galt, Ont.

Ingersoll Machine & Tool Co., Ltd.,  
Ingersoll, Ont.

Morse Twist Drill & Machine Co., New  
Bedford, Mass.

**Reamers, Taper**  
Butterfield & Co., Inc., Rock Island, Que.

Can. Detroit Twist Drill Co., Walker-  
ville, Ont.

Cleveland Twist Drill Co., Cleveland, O.

Foss Machinery & Supply Co., Geo. F.,  
Montreal, Que.

Garlock-Walker Mch. Co., Toronto, Ont.

Greenfield Tap & Die Corp., Galt, Ont.

Ingersoll Machine & Tool Co., Ltd.,  
Ingersoll, Ont.

Morrow Screw & Nut Co., Ltd., John,  
Ingersoll, Ont.

Pilot Steel & Tool Co., Montreal, Que.

Pratt & Whitney Co., of Canada, Ltd.,  
Dundas, Ont.

**Recorders, Temperature**  
Thor Instrument Co., Rochester, N.Y.

Walker & Sons Metal Products, Ltd.,  
Hiram, Walkerville, Ont.

**Recorders, Time**  
Gisholt Machine Co., Madison, Wis.

National Business Machines Co., To-  
ronto, Ont.

**Regulators, Automatic (for electric  
furnaces)**  
Volta Mfg. Co., Welland, Ont.

**Rheostats**  
Northern Electric Co., Montreal, Que.

**Resistance Materials**  
Walker & Sons Metal Products, Ltd.,  
Hiram, Walkerville, Ont.

**Respirators**  
Willson Goggles, Inc., Reading, Pa.

**Rivets**  
Farmer & Bulloch Co., Gananoque,  
Ont.

Steel Co. of Canada, Ltd., Hamilton, Ont.

Torrington Company, Ltd., Upper Bed-  
ford, Que.

**Rivet Heaters**  
Can. Ingersoll-Rand Co., Ltd., Sherbrooke,  
Que.

General Combustion Co. of Can., Ltd.,  
Montreal, Que.

Volta Mfg. Co., Welland, Ont.

**Rivet-Making Machinery**  
Arme Machinery Co., Cleveland, Ohio.

Bertram & Son Co., Ltd., The John,  
Dundas, Ont.

National Machinery Co., Tiffin, Ohio.

**Riveting Machines**  
Bliton Machine Co., Bridgeport, Conn.

Can. Fairbanks-Morse Co., Ltd., Montreal.

Can. Ingersoll-Rand Co., Ltd., Sherbrooke,  
Que.

High Speed Hammer Co., Rochester, N.Y.

Holden Co., Ltd., Montreal, Que.

Independent Pneumatic Tool, Chicago, Ill.

Keller Pneumatic Tool Co., Grand Haven,  
Mich.

Farmer & Bulloch Co., Gananoque,  
Ont.

Petrie, Ltd., H. W., Toronto, Ont.

Schuster Co., F. B., New Haven, Conn.

**Rolling Mill Equipment**  
Stewart & Co., Duncan, Glasgow, Scot.

**Rolls (Rubber Covered)**  
Can. Consolidated Rubber Co., Ltd.,  
Montreal, Que.

**Rudder Frames, Steel**  
Can. Steel Foundry, Montreal, Que.

Domination Foundries & Steel, Ltd., Ham-  
ilton, Ont.

**Rubber Goods, Mechanical**  
Quaker City Rubber Co., Philadelphia, Pa.

**Rules, Steel**  
Chesterman & Co., Ltd., J., Sheffield, Eng.

**Rules, Steel and Wood**  
Brown & Sharpe Mfg. Co., Providence, R.I.

**Rust Preventatives**  
Oakley Chemical Co., New York, N.Y.

**Sand Equipment**  
Can. Link-Belt Co., Toronto, Ont.

**Sand Mills**  
Frost Mfg. Co., Chicago, Ill.

**Sanding Machinery**  
Oliver Machinery Co., Grand Rapids, Mich.

**Sand Rammers, Pneumatic**  
Can. Ingersoll-Rand Co., Ltd., Sherbrooke,  
Que.

Cleveland Pneumatic Tool Co., Toronto,  
Ont.

Holden Co., Ltd., Montreal, Que.

Independent Pneumatic Tool, Chicago, Ill.

Keller Pneumatic Tool Co., Grand Haven,  
Mich.

**Saw Frames and Blades, Hack**  
Aikenhead Hardware Ltd., Toronto, Ont.

Atkins & Co., Inc., E. C., Indianapolis, I.

Clemson Bros., Inc., Hamilton, Ont.

Diamond Saw & Stamping Works, Ruf-  
falo, N.Y.

Foss Machinery & Supply Co., Geo. F.,  
Montreal, Que.

Rice Lewis & Son, Ltd., Toronto, Ont.

Simonds Canada Saw Co., Montreal, Que.

**Sawing Machines, Metal**  
Atkins & Co., Inc., E. C., Indianapolis, I.

Foss Machinery & Supply Co., Geo. F.,  
Montreal, Que.

Herbert Ltd., Alfred, Toronto, Ont.

Lyman Tube & Supply Co., Montreal, Que.

**Sawing Machines, Power Hack**  
Ackworth, Ltd., John, Birmingham, Eng.

Atkins & Co., Inc., E. C., Indianapolis, I.

Can. Fairbanks-Morse Co., Ltd., Montreal.

Oliver Machinery Co., Grand Rapids, Mich.

Petrie, Ltd., H. W., Toronto, Ont.

**Saw Sharpening Machines**  
Atkins & Co., Inc., E. C., Indianapolis, I.

Simonds Canada Saw Co., Montreal, Que.

**Saw Tables, Universal**  
Atkins & Co., Inc., E. C., Indianapolis, I.

Canada Machinery Corp., Galt, Ont.

Garlock-Walker Mch. Co., Toronto, Ont.

Oliver Machinery Co., Grand Rapids, Mich.

Petrie, Ltd., H. W., Toronto, Ont.

**Saws, Circular Metal**  
Atkins & Co., Inc., E. C., Indianapolis, I.

Simonds Canada Saw Co., Montreal, Que.

**Saws, Hand**  
Atkins & Co., Inc., E. C., Indianapolis, I.

Simonds Canada Saw Co., Montreal, Que.

**Saws, Hot and Cold**  
Atkins & Co., Inc., E. C., Indianapolis, I.

Atkins & Co., Inc., E. C., Indianapolis, I.

Stewart & Co., Duncan, Glasgow, Scot.

**Saws, High Speed Steel**  
Armstrong-Whitworth of Canada, Ltd.,  
Montreal, Canada.

# BUYERS' DIRECTORY

## Screw Machinery, Wood and Lax

Co. Co. And S., Hartford, Conn.

## Screw Machines

Brown & Sharpe Mfg. Co., Providence, R.I.

## Screw Machines, Automatic

Garlock-Walker Mch. Co., Toronto, Ont.  
Herbert Ltd., Alfred, Toronto, Ont.  
National Acme Co., Cleveland, Ohio.

## Screw Machines, Plain or Hand

Acme Machine Tool Co., Cincinnati, Ohio.  
Greenfield Tap & Die Corp., Galt, Ont.  
Herbert Ltd., Alfred, Toronto, Ont.  
Jones & Lamson Machine Co., Springfield, Vermont.

Pratt & Whitney Co. of Canada, Ltd., Dundas, Ont.  
Warner & Swasey Co., Cleveland, Ohio.

## Screw Machine Products

Torrington Company, Ltd., Upper Bedford, Que.

## Screw Plates

Alkenhead Hardware Ltd., Toronto, Ont.  
Butterfield & Co., Inc., Rock Island, Que.  
Greenfield Tap & Die Corp., Galt, Ont.  
Jardine & Co., A. B., Hespeler, Ont.

## Screws, Cap and Set

Galt Machine Screw Co., Galt, Ont.  
Morrow Screw & Nut Co., Ltd., John, Ingersoll, Ont.  
National Acme Co., Cleveland, Ohio.

Torrington Company, Ltd., Upper Bedford, Que.

## Screws, Lock Cap

Torrington Company, Ltd., Upper Bedford, Que.

## Screws, Machine

Barnes Co., Wallace, Bristol, Conn.  
Steel Co. of Canada, Ltd., Hamilton, Ont.  
Torrington Company, Ltd., Upper Bedford, Que.

## Screws, Safety Nut

Barnes Co., Wallace, Bristol, Conn.  
Galt Machine Screw Co., Galt, Ont.  
Morrow Screw & Nut Co., Ltd., John, Ingersoll, Ont.

## Screws, Side Knob

Torrington Company, Ltd., Upper Bedford, Que.

## Screws, Thumb

Torrington Company, Ltd., Upper Bedford, Que.

## Second-Hand Machinery

(See Searchlight Section)  
Petrie, Ltd., H. W., Toronto, Ont.

## Separators, Moisture and Oil

Russell, F. & Co., Ltd., Toronto, Can.  
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.

## Separators, Oil and Waste

Russell, F. & Co., Ltd., Toronto, Can.

## Shafting

Canada Foundries & Forgings Co., Welland, Ont.  
Can. Drawn Steel Co., Hamilton, Ont.  
N. Steel Co., Ltd., New Glasgow, N.S.  
Williams Machinery Co., A. R., Toronto, Ont.

Williams Machinery & Supply Co., A. R., Montreal, Que.

## Shapes, Cold-Drawn Special Steel

Union Drawn Steel Co., Hamilton, Ont.

## Shaping Machines

Canada Machinery Co., Galt, Ont.  
Foss Machinery & Supply Co., Geo. F., Montreal, Que.

Herbert Machine Co., Torrington, Conn.  
Herbert Ltd., Alfred, Toronto, Ont.  
Holly, R. S., Toronto, Ont.

Morton Mfg. Co., Muskegon, Mich.  
McDougal Co., Ltd., H., Buffalo, N.Y.  
Roelofson Machine & Tool Co., Toronto, Ont.

Smith & Mills Co., Cincinnati, Ohio.  
Walcott Lath Co., Jackson, Mich.  
Williams Machinery Co., A. R., Toronto, Ont.

## Shapers, Wood

Oliver Machinery Co., Grand Rapids, Mich.

## Shears, Hand

Can. Blower & Forge Co., Ltd., Kitchener.

## Shears, Power

Bliss Co., E. W., Brooklyn, N.Y.  
Brown, Rogers & Co., Ltd., Hamilton, Ont.  
Canada Machinery Corp., Galt, Ont.  
Can. Blower & Forge Co., Ltd., Kitchener.

Stall Co., Inc., D. H., Buffalo, N.Y.  
Terry Co., John C., Birmingham, Eng.  
Toledo Machine & Tool Co., Toledo, Ohio.

Williams Machinery Co., A. R., Toronto, Ont.

## Shearing Machines, Angle, Iron Bar and Gate

Bertram Ltd., Edinburgh, Scotland.

## Sheet Metal Working Machinery

Bliss Co., E. W., Brooklyn, N.Y.  
Brown, Rogers & Co., Ltd., Hamilton, Ont.  
Garlock-Walker Mch. Co., Toronto, Ont.  
Herbert Ltd., Alfred, Toronto, Ont.

Stall Co., Inc., D. H., Buffalo, N.Y.  
Terry Co., John C., Birmingham, Eng.  
Toledo Machine & Tool Co., Toledo, Ohio.

## Sheets, Nickel, Resist, Alloy

International Nickel Co. of Can., Ltd., Toronto, Ont.

## Sheets, Nickel, Monel and Fibre

Diamond State Fibre Co. of Can., Ltd., Toronto, Ont.

## Side Frames, Locomotive

Can. Steel Foundries, Montreal, Que.  
Dominion Foundries & Steel, Ltd., Hamilton, Ont.

## Slottings Attachments

Ford-Smith Machine Co., Ltd., Hamilton, Ont.  
Kearney & Trecker Co., Milwaukee, Wis.  
Kearney Mfg. Co., Milwaukee, Wis.  
National Acme Co., Cleveland, Ohio.

## Slottings Machines

Bertram & Son Co., Ltd., The John, Dundas, Ont.  
Canada Machinery Corp., Galt, Ont.  
Ford-Smith Machine Co., Hamilton, Ont.  
Herbert Ltd., Alfred, Toronto, Ont.

## Solders

British Smelting & Refining Co., Ltd., Montreal, Que.

Hort Metal Co., Toronto, Canada.

## Snap Flasks

Oliver Machy Co., Grand Rapids, Mich.

## Special Machinery and Tools

Brown Engineering Corp., Ltd., Toronto, Can.  
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.

Crescent Machine Co., Ltd., Montreal, Q.  
Ford-Smith Machine Co., Hamilton, Wis.  
Gibbott Machine Co., Madison, Wis.

Ingersoll Machine & Tool Co., Ltd., Ingersoll, Ont.  
National Acme Co., Cleveland, Ohio.

## Specialties, Swaged and Headed Wire

Torrington Company, Ltd., Upper Bedford, Que.

## Specialties, Industrial

Willson Goggles, Inc., Reading, Pa.

## Springs

Barnes Co., Wallace, Bristol, Conn.  
Cleveland Wire Spring Co., Cleveland, O.  
Dunbar Bros. Co., Bristol, Conn.  
Steele Ltd., James, Guelph, Ont.

## Spring-making Machinery

Sleeper & Hartley, Inc., Worcester, Mass.

## Sprockets and Chains

Can. Link-Belt Co., Toronto, Ont.  
Jones & Glasco, Montreal, Que.  
Lyman Tube & Supply Co., Montreal, Que.  
Morris Chain Co., Ithaca, N.Y.

Renold (Hans) of Canada, Ltd., Montreal, Que.

## Squares

Brown & Sharpe Mfg. Co., Providence, R.I.

## Stamping, Metal

Americas Pulley Co., Philadelphia, Pa.  
Barnes Co., Wallace, Bristol, Conn.  
Diamond Saw & Stamping Works, Buffalo, N.Y.

Fisher Motor Co., Ltd., Orillia, Ont.  
Keller Pneumatic Tool Co., Grand Haven, Mich.

Parmenter & Bulloch Co., Gananogue, Ont.  
Tallman Brass & Metal Co., Hamilton, Ont.

## Stamps, Steel

Diamond Saw & Stamping Works, Buffalo, N.Y.

## Stairways, Wrought Iron

Can. Wire & Iron Goods Co., Hamilton, Ont.

## Steam Specialties

Crane Ltd., Montreal, Que.

## Steel Plate

Dom. Foundries & Steel, Hamilton, Ont.

## Steels, Tool

Can. Atlas Crucible Steel Co., Toronto, Ont.

Vulcan Crucible Steel Co., Alliquippa, Pa.

## Steel Blooms and Billets

Steel Co. of Canada, Ltd., Hamilton, Ont.

## Steel, Cold-Rolled Strip

Andrews Steel Co., Newport, Ky.  
Barnes Co., Wallace, Bristol, Conn.  
Can. Driver-Harris Co., Walkerville, Ont.

Firth & Sons, Ltd., Thos., Montreal, Q.  
Ontario Metal Products Co., Ltd., Toronto, Ont.

## Steel Castings

Dom. Foundries & Steel, Hamilton, Ont.

## Steel Forgings

Dundon Foundries & Steel, Ltd., Hamilton, Ont.

## Steel, Shafting and Free Cutting

Screw

Barnes Co., Wallace, Bristol, Conn.  
Can. Drawn Steel Co., Hamilton, Ont.  
Union Drawn Steel Co., Hamilton, Ont.

## Steel, Sheet

Dominion Foundries & Steel, Ltd., Hamilton, Ont.

Firth & Sons, Ltd., Thos., Montreal, Q.  
Ontario Metal Products Co., Ltd., Toronto, Ont.

Rice Lewis & Son, Ltd., Toronto, Ont.  
Steel Co. of Can., Ltd., Hamilton, Ont.  
Toronto Iron Works, Toronto, Ont.

## Steel, Tanks

Can. John Wood Mfg. Co., Toronto, Ont.

Canadian Atlas Crucible Steel Co., Ltd., Toronto, Ont.

Steel Co. of Can., Ltd., Hamilton, Ont.  
Vanadium Alloys Steel, Latrobe, Pa.

## Steel Wire Rods

Steel Co. of Canada, Ltd., Hamilton, Ont.

## Steels, Alloy, Open Hearth and Electric

Can. Atlas Crucible Steel Co., Ltd., Toronto, Ont.

United Alloy Steel Corp., Canton, Ohio.

## Steels, Alloy and Carbon

Algonia Steel Corp., Ltd., Sault Ste. Marie, Ont.

Andrew Steel Co., Newport, Ky.  
Armstrong Whitworth Co. of Can., Ltd., Montreal, Que.

Atkins & Co., Ltd., Wm., Sheffield, Eng.  
Barnes Co., Wallace, Bristol, Conn.

Canadian Atlas Crucible Steel Co., Ltd., Toronto, Ont.

Can. Driver-Harris Co., Walkerville, Ont.  
Steel Foundries, Montreal, Que.

Dom. Foundries & Steel, Hamilton, Ont.  
Firth & Sons, Ltd., Thos., Montreal, Q.

Dundon Foundries & Steel, Ltd., Hamilton, Ont.

Pilot Steel & Tool Co., Montreal, Que.

Rice Lewis & Son, Ltd., Toronto, Ont.

Steel Co. of Can., Ltd., Hamilton, Ont.

Swedish Crucible Steel Co. of Canada, Ltd., Windsor, Ont.

United Alloy Steel Corp., Canton, Ohio.

Vanadium Alloys Steel, Latrobe, Pa.

Vulcan Crucible Steel Co., Alliquippa, Pa.

## Steels, High-Speed

Armstrong Bros. Tool Co., Chicago, Ill.  
Armstrong Whitworth Co. of Can., Ltd., Montreal, Que.

Atkins & Co., Ltd., Wm., Sheffield, Eng.  
Barnes & David, Ltd., Toronto, Ont.

Canadian Atlas Crucible Steel Co., Ltd., Toronto, Ont.

Drury Ltd., H. A., Montreal, Que.

Firth & Sons, Ltd., Thos., Montreal, Q.

Pilot Steel & Tool Co., Montreal, Que.

Rice Lewis & Son, Ltd., Toronto, Ont.

Steel Co. of Can., Ltd., Hamilton, Ont.

Vanadium Alloys Steel, Latrobe, Pa.

Vulcan Crucible Steel Co., Alliquippa, Pa.

## Steel, Magnet

Can. Atlas Crucible Steel Co., Toronto, Ont.

Vanadium Alloys Steel, Latrobe, Pa.

## Steel, Structural

MacKinnon Steel Co., Sherbrooke, Que.

## Steel Tubing, Close Joint and Welded

Standard Tube & Fence Co., Ltd., Woodstock, Ont.

## Stern Frames, Cast Steel

Can. Steel Foundries, Montreal, Que.

Dom. Foundries & Steel, Ltd., Hamilton, Ont.

## Straightening Machinery

Bertram Ltd., Edinburgh, Scotland.

## Studs

Galt Machine Screw Co., Galt, Ont.

## Surface Plates

Bilton Machine Co., Bridgeport, Conn.

## Swaging Machines

Atkins & Co., Inc., E. C., Indianapolis, I.

End Machine Co., Toledo, Ohio.

## Swaging Machine Parts

End Machine Co., Toledo, Ohio.

## Switches, Railway

Can. Steel Foundries, Montreal, Que.

## Switches and Switchboards

Northern Electric Co., Montreal, Que.

Tablets, Bronze, Memorial

Tallman Brass & Metal, Ltd., Hamilton, Ont.

Tachometers

Alkenhead Hardware Ltd., Toronto, Ont.

Pratt Co., Waterbury, Conn.

Tanks, Steel

MacKinnon Steel Co., Sherbrooke, Que.

Tanks and Pumps, Oil

Bowser, S. F. & Co., Ltd., Toronto, Can.

Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.

Toronto Iron Works, Toronto, Ont.

Tap

James

London

Machine

Co., Spring-

field, Vt.

Tap Holders

Greenfield Tap & Die Corp., Galt, Ont.

Pratt & Whitney Co. of Canada, Ltd., Dundas, Ont.

Taper Pins

Salt Machine Screw Co., Galt, Ont.

Morrow Screw & Nut Co., Ltd., John, Ingersoll, Ont.

Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Tapes, Measuring

Chesterman & Co., Ltd., J., Sheffield, Eng.

Starratt Co., L. S., Athol, Mass.

Tapping Machines and Attachments

Ackworth, Ltd., John, Birmingham, Eng.

Archibald & Co., Chas. F., Montreal, Q.

Burke Machine Tool Co., Concord, Ohio.

Geometric Tool Co., New Haven, Conn.

Greenfield Tap & Die Corp., Galt, Ont.

Jardine & Co., A. B., Hespeler, Ont.

National Acme Co., Cleveland, Ohio.

Petrie, Ltd., H. W., Toronto, Ont.

Starratt Co., L. S., Athol, Mass.

Taps and Dies

Ackworth, Ltd., John, Birmingham, Eng.

Butterfield & Co., Inc., Rock Island, Que.

Can. Fairbanks-Morse Co., Ltd., Montreal.  
Geometric Tool Co., New Haven, Conn.  
Greenfield Tap & Die Corp., Galt, Ont.  
International Machinery & Supply Co., Montreal, Que.

Jardine & Co., A. B., Hespeler, Ont.  
Morse Twist Drill & Machine Co., New Bedford, Mass.  
National Acme Co., Cleveland, Ohio.  
Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

## Taps, Collapsing

Geometric Tool Co., New Haven, Conn.  
Jardine & Co., A. B., Hespeler, Ont.  
Murphy Machine & Tool Co., Detroit, Mich.  
National Acme Co., Cleveland, Ohio.  
Victor Tool Co., Weynesboro, Pa.

## Teeth, Dredge Bucket

Kennedy & Sons, Wm., Owen Sound, Ont.

## Testing Metals and Materials

Torrington Testing Laboratory, Toronto, Ont.

## Thermometers

Bristol Co., Waterbury, Conn.

## Thread-Cutting Tools

Butterfield & Co., Inc., Rock Island, Que.  
Greenfield Tap & Die Corp., Galt, Ont.  
Jones & Lamson Machine Co., Springfield, Vermont.

Murphy Machine & Tool Co., Detroit, Mich.

National Acme Co., Cleveland, Ohio.

Pratt & Whitney Co., of Canada, Ltd., Dundas, Ont.

Victor Tool Co



# BUYERS' DIRECTORY

**Torches, Blow**  
National Electric Products, Ltd., Toronto, Ont.  
Perdue, W. B., San Francisco, Calif.  
Prest-O-Lite Co. of Can., Toronto, Ont.  
Rice Lewis & Son, Ltd., Toronto, Ont.

**Trackwork, Railway**  
Can. Steel Foundries, Montreal, Que.

**Trackwork, Manganese Steel**  
Can. Steel Foundries, Montreal, Que.

**Transformers**  
Northern Electric Co., Montreal, Que.

**Transmission Machinery**  
Bernard Industrial Co., A., Fortville, Que.  
Can. Link-Belt Co., Toronto, Ont.  
Garlock-Walker Mch. Co., Toronto, Ont.  
Jones & Glasco, Montreal, Que.  
Kennedy & Sons, Wm., Owen Sound, Ont.  
Petrie, Ltd., H. W., Toronto, Ont.  
Prest-O-Lite Co. of Can., Toronto, Ont.  
Renold (Hans) of Canada, Ltd., Montreal, Que.

**Transportation Systems (See Trucks)**  
Mathers Gravity Carrier Co., Port Hope, Ont.

**Treated Bits**  
Can. Atlas Crucible Steel Co., Toronto, Ont.  
Vanadium Alloys Steel, Latrobe, Pa.

**Trolleys and Tramways**  
Can. Link-Belt Co., Toronto, Ont.  
Morrison Crane & Hoist Co., Ltd., Niagara Falls, Ont.  
Northern Crane Works, Walkerville, Ont.  
Wright Mfg. Co., Lisbon, Ohio.

**Trucks**  
Can. Fairbanks-Morse Ltd., Montreal Q.  
Diamond State Fibre Co. of Can., Ltd., Toronto, Ont.  
Hepburn Ltd., John T., Toronto, Ont.  
Maple Leaf Mfg. Co., Montreal, Que.  
Morrison Crane & Hoist Co., Ltd., Niagara Falls, Ont.  
National Steel Car Corp., Ltd., Hamilton, Ont.

**Trucks, Industrial Motor**  
Maple Leaf Mfg. Co., Montreal, Que.  
National Steel Car Corp., Ltd., Hamilton, Ont.

**Tube, Products**  
Tube Co. of Canada, Toronto, Ont.

**Tubing, Electric Welded or Oxy-Acetylene Welded**  
Tube Co. of Canada, Toronto, Ont.

**Tubing, Flexible**  
Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont.  
Goodyear Tire & Rubber Co. of Can., Ltd., Toronto, Ont.

**Tubing, Seamless Steel**  
Tube Co. of Canada, Toronto, Ont.

**Tubing, Seamless Steel, Brass and Copper and Fibre**  
Diamond State Fibre Co. of Can., Ltd., Toronto, Ont.  
Don Steel Products Co., Brantford, Ont.  
Lymann Tube & Supply Co., Montreal, Que.  
Ontario Metal Products Co., Ltd., Toronto, Ont.  
Tallman Brass & Metal Co., Hamilton, Ont.

**Tubing, Welded**  
International Nickel Co. of Can., Ltd., Toronto, Ont.  
Ontario Metal Products Co., Ltd., Toronto, Ont.

**Tubing, Welded Steel**  
Tube Co. of Canada, Toronto, Ont.

**Turbines, Water**  
Kennedy & Sons, Wm., Owen Sound, Ont.

**Turret Heads**  
Ackworth, Ltd., John, Birmingham, Eng.  
Bertram & Son Co., Ltd., The John, Dundas, Ont.

**Turret Machines (See Lathes, Horizontal Turret)**  
Acme Machine Tool Co., Cincinnati, Ohio.  
Cool Co., Asa S., Hartford, Conn.  
Gisholt Machine Co., Madison, Wis.  
Jones & Lamson Machine Co., Springfield, Vermont.  
National Acme Co., Cleveland, Ohio.  
Pratt & Whitney Co. of Canada, Ltd., Dundas, Ont.  
Steinle Turret Machine Co., Madison, Wis.  
Warner & Swasey Co., Cleveland, Ohio.

**Turrets, Tool Post**  
Gisholt Machine Co., Madison, Wis.

**Unions, Pipe**  
Crane Ltd., Montreal, Que.

**Universal Joints**  
Ford-Smith Machine Co., Hamilton, Ont.  
Holden Co., Ltd., Montreal, Que.

**Valves**  
Can. Fairbanks-Morse Ltd., Montreal Q.  
Cleveland Pneumatic Tool Co., Toronto, Ont.  
Crane Ltd., Montreal, Que.  
Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont.  
Goodyear Tire & Rubber Co. of Can., Ltd., Toronto, Ont.

**Vices, Drilling Machine**  
Hoosier Drilling Mach. Co., Goshen, Ind.  
Kemp Smith Mfg. Co., Milwaukee, Wis.

**Vices, Metal Workers'**  
Aikenhead Hardware, Ltd., Toronto, Ont.  
Columbia Hdw. Division, Cleveland, Q.

**Vices, Milling Machine**  
Brown & Sharpe Mfg. Co., Providence, R.I.  
Crescent Machine Co., Ltd., Montreal, Q.  
Ford-Smith Machine Co., Hamilton, Ont.  
Hendey Machine Co., Torrington, Conn.  
Hoosier Drilling Mach. Co., Goshen, Ind.  
Keamney & Trecker Co., Milwaukee, Wis.  
Kemp Smith Mfg. Co., Milwaukee, Wis.

**Victor Tool Co., Waynesboro, Pa.**  
Parmenter & Bulloch Co., Gananoque, Ont.

**Voltmeters**  
Bristol Co., Waterbury, Conn.  
Northern Electric Co., Montreal, Que.

**Wagon Loaders**  
Can. Link-Belt Co., Toronto, Ont.

**Washers**  
Barnes Co., Wallace, Bristol, Conn.  
Diamond State Fibre Co., Toronto, Ont.  
Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont.  
Goodyear Tire & Rubber Co. of Can., Ltd., Toronto, Ont.  
Graton & Knight Mfg. Co., Worcester, Mass.  
McGowan Belting Co., J. C., Montreal, Que.  
Steel Co. of Canada, Ltd., Hamilton, Ont.  
Tinning Company, Ltd., Upper Bedford, Que.

**Welding Machines, Oxy-Acetylene**  
Davis-Bournville Co., Jersey City, N.J.  
Holden Co., Ltd., Montreal, Que.  
L'Air Liquide Society, Toronto, Ont.  
Perdue, W. B., San Francisco, Calif.  
Prest-O-Lite Co. of Can., Toronto, Ont.

**Welding, Oxy-Acetylene**  
Carter Welding Co., Toronto, Ont.  
Davis-Bournville Co., Jersey City, N.J.  
Holden Co., Ltd., Montreal, Que.  
Lincoln Electric Co., Toronto, Ont.  
National Electric Products, Toronto, Ont.  
Prest-O-Lite Co. of Can., Toronto, Ont.  
Union Carbide Co. of Can., Welland, Ont.

**Welding Rod, Tobin, Manganese Bronze and Aluminum**  
Tallman Brass & Metal, Ltd., Hamilton, Ont.

**Welding Supplies**  
British Smelting & Refining Co., Ltd., Montreal, Que.  
Carter Welding Co., Toronto, Ont.  
Davis-Bournville Co., Jersey City, N.J.  
L'Air Liquide Society, Toronto, Ont.  
Lincoln Electric Co., Toronto, Ont.  
National Electric Products, Toronto, Ont.  
Perdue, W. B., San Francisco, Calif.  
Prest-O-Lite Co. of Can., Toronto, Ont.  
Union Carbide Co. of Can., Welland, Ont.

**Wheels, Cast, Steel**  
Dominion Foundries & Steel, Ltd., Hamilton, Ont.

**Wheels, Industrial**  
American Pulley Co., Philadelphia, Pa.  
Hull Iron & Steel Foundries, Hull, Que.  
Kennedy & Sons, Wm., Owen Sound, Ont.

**Winches, Electric**  
Shepard Electric Crane & Hoist Co., Montreal, Que.  
Volta Mfg. Co., Welland, Ont.

**Winches, Headgate**  
Kennedy & Sons, Wm., Owen Sound, Ont.

**Winches, Stopping**  
Kennedy & Sons, Wm., Owen Sound, Ont.

**Wire**  
Barnes Co., Wallace, Bristol, Conn.  
Canada Metal Co., Ltd., Toronto, Ont.  
Dennis Wire & Iron Works, London, Ont.  
Greening Wire Co., B., Hamilton, Ont.  
Northern Electric Co., Montreal, Que.

**Wire Cloth**  
Can. Wire & Iron Goods Co., Hamilton, Ont.

**Wire Coiling Machinery**  
Sleeper & Hartley, Inc., Worcester, Mass.

**Wire Rope**  
Can. Wire & Iron Goods Co., Hamilton, Ont.

**Wire Straightening and Cutting Machinery**  
Canada Machinery Corp., Bridgeport, Conn.  
Brown, Boggs & Co., Ltd., Hamilton, Ont.  
Schuster Co., F. B., New Haven, Conn.  
Sleeper & Hartley, Inc., Worcester, Mass.

**Wire, Welding**  
L'Air Liquide Society, Toronto, Ont.  
National Electric Products, Ltd., Toronto, Ont.  
Perdue, W. B., San Francisco, Calif.  
Prest-O-Lite Co. of Can., Toronto, Ont.  
Tallman Brass & Metal Co., Hamilton, Ont.

**Wires, Special**  
Dennis Wire & Iron Works, London, Ont.  
Greening Wire Co., B., Hamilton, Ont.  
Walker & Sons Metal Products, Ltd., Hiram, Walkerville, Ont.

**Woodworking Machinery**  
Canada Machinery Corp., Galt, Ont.  
Can. Fairbanks-Morse Co., Ltd., Montreal, Que.  
Garlock-Walker Mch. Co., Toronto, Ont.  
Oliver Machinery Co., Grand Rapids, Mich.  
Williams Machinery Co., A. R., Toronto, Ont.

**Wrenches, Drop Forged**  
Armstrong Bros. Tool Co., Chicago, Ill.  
Canada Foundries & Forgings Co., Welland, Ont.

**Wrenches, Machinists'**  
Armstrong Bros. Tool Co., Chicago, Ill.  
Canada Foundries & Forgings Co., Welland, Ont.

**Wrenches, Pipe**  
Canada Foundries & Forgings Co., Welland, Ont.  
Crane Ltd., Montreal, Que.  
Greenfield Tap & Die Corp., Galt, Ont.

**Wrenches, Tap**  
Butterfield & Co., Inc., Rock Island, Que.  
Greenfield Tap & Die Corp., Galt, Ont.

**Wrought Iron Pipe**  
Steel Co. of Canada, Ltd., Hamilton, Ont.

## DIRECTORY OF DEALERS

THE Buyers' Directory of CANADIAN MACHINERY was originally intended to contain information regarding lines actually manufactured by our advertisers. We now carry the advertising of leading machinery dealers, some of whom represent scores of manufacturers in addition to being manufacturers themselves in some cases. This necessarily widened the scope of our Directory, but it would be impracticable to list the lines handled by all the dealers. We recommend, therefore, if our subscribers cannot find what they want in our Directory that they communicate with the dealers whose names appear herewith.

### MACHINE TOOLS AND METAL WORKING EQUIPMENT

Chas. P. Archibald & Co., Montreal, Que.  
The Canadian Fairbanks-Morse Co., Montreal, Que.  
The Garlock-Walker Machinery Co., Toronto, Ont.  
R. S. Holly, Toronto, Ont.  
H. W. Petrie Limited, Toronto, Ont.  
The Standard Equipment & Tool Co., Montreal, Que.

Chas. P. Archibald & Co., Montreal, Que.  
The Canadian Fairbanks-Morse Co., Montreal, Que.  
The Garlock-Walker Machinery Co., Toronto, Ont.  
R. S. Holly, Toronto, Ont.  
H. W. Petrie Limited, Toronto, Ont.  
The Standard Equipment & Tool Co., Montreal, Que.

Chas. A. Strellinger Co. of Canada Limited, Windsor, Ont.  
A. R. Williams Machinery Co., Toronto, Ont.  
A. R. Williams Machinery Co., Montreal, Que.  
Wilson-McGovern Limited, Toronto, Ont.  
Yeates Machinery Co., London, Ont.

### MACHINE SHOP AND FACTORY SUPPLIES

Chas. P. Archibald & Co., Montreal, Que.  
The Canadian Fairbanks-Morse Co., Montreal, Que.  
The Garlock-Walker Machinery Co., Toronto, Ont.  
R. S. Holly, Toronto, Ont.  
H. W. Petrie Limited, Toronto, Ont.  
The Standard Equipment & Tool Co., Montreal, Que.

Chas. A. Strellinger Co. of Canada Limited, Windsor, Ont.  
A. R. Williams Machinery Co., Toronto, Ont.  
A. R. Williams Machinery Co., Montreal, Que.  
Wilson-McGovern Limited, Toronto, Ont.  
Yeates Machinery Co., London, Ont.

### POWER EQUIPMENT AND SUPPLIES

The Canadian Fairbanks-Morse Co., Montreal, Que.  
MacGovern & Co., Montreal, Que.  
H. W. Petrie Limited, Toronto, Ont.

The Standard Equipment & Tool Co., Montreal, Que.  
Wilson-McGovern Limited, Toronto, Ont.  
A. R. Williams Machinery Co., Montreal, Que.

### WOODWORKING MACHINERY

Chas. P. Archibald & Co., Montreal, Que.  
The Canadian Fairbanks-Morse Co., Montreal, Que.  
The Garlock-Walker Machinery Co., Toronto, Ont.  
R. S. Holly, Toronto, Ont.

H. W. Petrie Limited, Toronto, Ont.  
Chas. A. Strellinger Co. of Canada Limited, Windsor, Ont.  
A. R. Williams Machinery Co., Toronto, Ont.  
A. R. Williams Machinery Co., Montreal, Que.  
Yeates Machinery Co., London, Ont.

**Vices, Pipe**  
Columbia Hdw. Division, Cleveland, Q.  
Greenfield Tap & Die Corp., Galt, Ont.

**Vices, Planer and Shaper**  
Bertram & Son Co., Ltd., The John, Dundas, Ont.  
Hendey Machine Co., Torrington, Conn.  
Hoosier Drilling Mach. Co., Goshen, Ind.  
Kemp Smith Mfg. Co., Milwaukee, Wis.  
McDougal Co., Ltd., B., Galt, Ont.  
Superior Machine Co., London, Ont.

**Vices, Wood Workers'**  
Columbia Hdw. Division, Cleveland, Q.  
Foss Machinery & Supply Co., Galt, Ont.  
Oliver Machy. Co., Grand Rapids, Mich.

**Washers, Rubber**  
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.

**Welding Apparatus, Oxy-Acetylene**  
L'Air Liquide Society, Toronto, Ont.

**Welding, Electric**  
All-Weld Company, Toronto, Ont.  
Carter Welding Co., Toronto, Ont.  
Lincoln Electric Co., Toronto, Ont.  
National Electric Products, Toronto, Ont.

**Welding Filler Rods**  
L'Air Liquide Society, Toronto, Ont.  
National Electric Products, Ltd., Toronto, Ont.  
Perdue, W. B., San Francisco, Calif.  
Prest-O-Lite Co. of Can., Toronto, Ont.

## CANADIAN MACHINERY AND MANUFACTURING NEWS

143 UNIVERSITY AVE., TORONTO, CANADA

CANADA—Montreal, Southam Bldg., 123 Fleury St., Phone Main 1004. Winnipeg, 901 Confederation Life Bldg., Phone Main 3449. Vancouver, 314 Carter-Cotton Bldg., 198 Hastings St. West. St. John, N.B., John S. Scott, General Delivery.

GREAT BRITAIN—London, The MacLean Publishing Company of Great Britain, Limited, 88 Fleet St., E. C., E. J. Dodd, Director, Telephone Central 12960. Cable Address: Atabek, London, Eng.

UNITED STATES—New York, J. J. Gillen, 1606 St. James Bldg., 1133 Broadway, Phone Watkins 5869. Boston, C. L. Morton, Room 734, Old South Bldg., Phone Main 1024. Chicago, A. H. Byrne, 405-6 Transportation Bldg., 608 S. Dearborn St., Phone Washash 9450. Cleveland, W. L. Gifford, 1261 East 99th Street.

# STEEL TUBING

**C**LOSE Joints and Welded Steel Tubing for Bedsteads, Trolley Arms, Agricultural Implements, and all other manufacturing purposes, reliable quality, uniform in size, 14 to 20 gauge,  $\frac{3}{8}$ " to 2" outside diameter.

## STANDARD TUBE COMPANY, LIMITED

WOODSTOCK, ONT.

### INDEX TO ADVERTISERS

|   |                         |   |                    |
|---|-------------------------|---|--------------------|
| <b>A</b>                                    |                         | <b>R</b>                                  |                    |
| Acme Machinery Co. ....                     | 18                      | Reed' Co. Geo. W. ....                    | 7                  |
| Acme Machine Tool Co. ....                  | 36                      | Renold Co. of Can., Hans. ....            | 38, 125            |
| Ackworth Ltd., John ....                    | 36                      | Rice Lewis & Son ....                     | 130                |
| Aikenhead Hardware Ltd. ....                | 110, 111                | Robertson Co., H. H. ....                 | 35                 |
| Algoma Steel Corp. ....                     | 4                       | Rockford Drilling Co. ....                | 148                |
| American Lead Pencil Co. ....               | 60                      | Rockford Milling Machine Co. ....         | 51                 |
| American Pulley Co. ....                    | 61                      | Rockwell & Co., W. S. ....                | 53                 |
| Armstrong Bros. Tool Co. ....               | 44                      | Roeifson Machine & Tool Co. ....          | 17                 |
| Armstrong Whitworth of Can., Ltd. ....      | 51, 121                 | Royal Bank of Canada. ....                | 8                  |
| Atlas Press Co., John ....                  | 116                     |   |                    |
| Atkins Co., Ltd., E. C. ....                | 113                     | <b>S</b>                                  |                    |
| Aurora Tool Works ....                      | 151                     | Selson Engineering Co. ....               | 43                 |
|   |                         | Sheffield Engineering Supplies, Ltd. .... | 5                  |
| <b>B</b>                                    |                         | Shuster Co., F. B. ....                   | 29                 |
| Banfield & Sons, W. H. ....                 | Inside back cover       | Skinner Bros. Mfg. Co. ....               | 29                 |
| Barnes Co., Wallace ....                    | 134                     | Skinner Chuck Co. ....                    | 150                |
| Bertram & Sons Co., John ....               | Front cover, 1          | Smooth-On Mfg. Co. ....                   | 44                 |
| Bertrams, Ltd. ....                         | 117                     | Standard Optical Co. ....                 | 56                 |
| Bilton Machine Tool Co. ....                | 37                      | Standard Tube Co. ....                    | 146                |
| Bliss Co., E. W. ....                       | 55                      | Starrett Co., L. S. ....                  | 147                |
| Bowser & Co., S. F. ....                    | 52                      | Steel Co. of Can., Ltd. ....              | 50                 |
| Bradley & Son, C. C. ....                   | 136                     | Steele Ltd., James ....                   | 116                |
| Brantford Oven Rack Co. ....                | 117                     | Steinle Turret Machine Co. ....           | 29                 |
| Bristol Company ....                        | 36                      | Stoll Co., D. H. ....                     | 149                |
| British Can. Machine Tool Co. ....          | 122                     | Sumner & Co. ....                         | 58                 |
| Brown, Boggs & Co. ....                     | 12, 13                  | St. Catharines, City of ....              | 47                 |
| Brown Engineering Co. ....                  | 150                     |   |                    |
| Brown & Sharpe Mfg. Co. ....                | 63                      | <b>T</b>                                  |                    |
| Burke Machine Tool Co. ....                 | 43                      | Toledo Mach. & Tool Co. ....              | 44                 |
| Butterfield & Co. ....                      | 33                      | Trabern Pump' Co. ....                    | Outside back cover |
|   |                         | Toronto Iron Works ....                   | 137                |
| <b>C</b>                                    |                         | Torrington Company ....                   | 162                |
| Can. Allis-Chalmers Co. ....                | 120                     | Tullis & Son, Ltd., John ....             | 45                 |
| Can. Atlas Crucible Steel Co. ....          | 61                      |   |                    |
| Canada Foundries & Forgings. ....           | 60                      | <b>U</b>                                  |                    |
| Canada Metal Co. ....                       | 7                       | Union Drawn Steel Co. ....                | 151                |
| Can. Fairbanks-Morse Co., Ltd. ....         | 65                      | Union Mfg. Co. ....                       | 31                 |
| Can. Drawn Steel Co. ....                   | 151                     | United Alloy Steel Corp. ....             | 32                 |
| Can. Driver-Harris Co., Ltd. ....           | 151                     | Underwood Corp., H. B. ....               | 45                 |
|   |                         | U.S. Electrical Tool Co. ....             | 129                |
| Can. Hanson & Van Winkle Co. ....           | 19                      | United States Machine Tool Co. ....       | 7                  |
| Can. Hart Products Ltd. ....                | 123                     | Universal Machine & Tool Co. ....         | 50                 |
| Can. Ingersoll-Rand Co. ....                | 6                       |   |                    |
| Can. Steel Foundries, Ltd. ....             | 9                       |   |                    |
| Can. Winkley Co. ....                       | 149                     |   |                    |
| Carter Welding Co. ....                     | 102                     |   |                    |
| Cincinnati Electric Tool Co. ....           | 149                     |   |                    |
| City of St. Catharines ....                 | 47                      |   |                    |
| Classified Opportunities ....               | 118, 119, 120, 121, 122 |   |                    |
| Cleveland Twist Drill Co. ....              | 33                      |   |                    |
| Cleveland Pneumatic Tool Co. ....           | 53                      |   |                    |
| Cleveland Wire Spring Co. ....              | 117                     |   |                    |
| Crescent Machine Co. ....                   | 148                     |   |                    |
| Consumers' Metal Co. ....                   | 122                     |   |                    |
| Cook, A. S. ....                            | 31                      |   |                    |
| Cushman Chuck Co. ....                      | 150                     |   |                    |
|   |                         |   |                    |
| Dalton Mfg. Co. ....                        | 128                     |   |                    |
| Darling Bros., Ltd. ....                    | 149                     |   |                    |
| Davidson & Co., F. ....                     | 3                       |   |                    |
| Davidson Mfg. Co., Ltd., The                | Thos. ....              |   |                    |
| Thos. ....                                  | 151                     |   |                    |
|   |                         |   |                    |
| Davis Bournonville Co. ....                 | 151                     |   |                    |
| Diamond Saw & Stamping Wks. ....            | 128                     |   |                    |
| Dickow, Fred C. ....                        | 116                     |   |                    |
| Dominion Abrasive Wheel Co. ....            | 140                     |   |                    |
| Dominion Belting Co. ....                   | 117                     |   |                    |
| Dominion Bridge Co., Ltd. ....              | 38                      |   |                    |
| Dominion Engineering Works. ....            | 128                     |   |                    |
| Dom. Forge & Stamping Co. ....              | 59                      |   |                    |
| Dom. Foundries & Steel Co. ....             | 9                       |   |                    |
| Dominion Rubber System ....                 | 15                      |   |                    |
| Dominion Steel Products ....                | 117                     |   |                    |
| Dunlop Tire & Rubber Goods Co. ....         | 16                      |   |                    |
|   |                         |   |                    |
| <b>E</b>                                    |                         |   |                    |
| Empire Tool Works ....                      | 123                     |   |                    |
| Etna Machine Co. ....                       | 141                     |   |                    |
| Elk Firebrick Co. ....                      | 37                      |   |                    |
|   |                         |   |                    |
| <b>F</b>                                    |                         |   |                    |
| Fellows Gear Shaper Co. ....                | 40                      |   |                    |
| Fetherstonhaugh & Co. ....                  | 117                     |   |                    |
| Fisher Motor Co. ....                       | 149                     |   |                    |
| Fittings Limited ....                       | 149                     |   |                    |
| Flexible Steel Lacing Co. ....              | 59                      |   |                    |
| Ford-Smith Machine Co. ....                 | 10, 123                 |   |                    |
| Frost Mfg. Co. ....                         | 148                     |   |                    |
| Franklin Die Casting Corp. ....             | 137                     |   |                    |
|   |                         |   |                    |
| <b>G</b>                                    |                         |   |                    |
| Galt Machine Screw Co. ....                 | 5                       |   |                    |
| Gardner & Sons ....                         | 52                      |   |                    |
| Garlock-Walker Machy. Co. ....              | 115                     |   |                    |
| Geometric Tool Co. ....                     | 109                     |   |                    |
| General Combustion Co. ....                 | 142                     |   |                    |
| Gisholt Machine Co. ....                    | 65                      |   |                    |
| Greenfield Tap & Die Corp. ....             | 26                      |   |                    |
|   |                         |   |                    |
| <b>H</b>                                    |                         |   |                    |
| Hamilton Engineering Service, Ltd. ....     | 117                     |   |                    |
| Hamilton Gear Machine Co. ....              | 128                     |   |                    |
| Hanna & Co., M. A. ....                     | 107                     |   |                    |
| Hartz & Co., J. F. ....                     | 25                      |   |                    |
| Head Machine Co. ....                       | 37                      |   |                    |
| Henry & Wright Mfg. Co. ....                | 129                     |   |                    |
| Hepburn Ltd., J. T. ....                    | 145                     |   |                    |
| High Speed Hammer Co. ....                  | 64                      |   |                    |
| Hofter Mfg. Co. ....                        | 119                     |   |                    |
| Holly, R. S. ....                           | 119                     |   |                    |
| Hoyt Metal Co. ....                         | 62                      |   |                    |
| Hughes, Owen Co., Ltd. ....                 | 148                     |   |                    |
| Hull Iron & Steel Foundries, Ltd. ....      | 54                      |   |                    |
|   |                         |   |                    |
| <b>I</b>                                    |                         |   |                    |
| Ingersoll File Co. ....                     | 42                      |   |                    |
| Ingersoll Machine Co., Ltd. ....            | 22                      |   |                    |
| International Malleable Iron Co., Ltd. .... | 34                      |   |                    |
| International Nickel Co. ....               | 28                      |   |                    |
|   |                         |   |                    |
| <b>J</b>                                    |                         |   |                    |
| Jacobs Mfg. Co. ....                        | 152                     |   |                    |
|   |                         |   |                    |
| Jardine & Co., A. B. ....                   | 5                       |   |                    |
| Johnston Machine Co., Carlyle. ....         | 8                       |   |                    |
|   |                         |   |                    |
| <b>K</b>                                    |                         |   |                    |
| Katie Foundry ....                          | 150                     |   |                    |
| Kearney & Trecker Co. ....                  | 49                      |   |                    |
| Keller Pneumatic Tool Co. ....              | 150                     |   |                    |
| Kennedy & Sons, Ltd., Wm. ....              | 61                      |   |                    |
| Ker & Goodwin Machinery Co. ....            | 31                      |   |                    |
| Kimber & Hillier Mfg. Co. ....              | 117                     |   |                    |
|   |                         |   |                    |
| <b>L</b>                                    |                         |   |                    |
| Landis Machine Co. ....                     | 21                      |   |                    |
| Landis Tool Co. ....                        | 39, 124                 |   |                    |
| La Salle Tool Co. ....                      | 42                      |   |                    |
| London Bolt & Hinge Co. ....                | 116                     |   |                    |
|   |                         |   |                    |
| <b>M</b>                                    |                         |   |                    |
| MacFarlane Engineering Co., G. W. ....      | 141                     |   |                    |
| Madison Mfg. Co. ....                       | 151                     |   |                    |
| Main Belting Co. ....                       | 42                      |   |                    |
| MacGovern & Co. ....                        | 119                     |   |                    |
| Manitoba Steel Foundries, Ltd. ....         | 148                     |   |                    |
| McDougall Co., Ltd., R. ....                | 62                      |   |                    |
| McLaren Co., D. K. ....                     | 151                     |   |                    |
| McLaren Belting Co., J. C. ....             | 151                     |   |                    |
| Mechanical Engineering Co. ....             | 148                     |   |                    |
| Miller Bros. & Sons, Ltd. ....              | 149                     |   |                    |
| Modern Tool Co. ....                        | 139                     |   |                    |
| Morris Crane & Hoist Co., Herbert ....      | 46                      |   |                    |
| Morse Chain Co. ....                        | 24                      |   |                    |
| Morse Twist Drill Co. ....                  | 38                      |   |                    |
| Morton Mfg. Co. ....                        | 143                     |   |                    |
|   |                         |   |                    |
| <b>N</b>                                    |                         |   |                    |
| National Acme Co. ....                      | 23, 138                 |   |                    |
| National Machinery Co. ....                 | 148                     |   |                    |
| National Gas Engine Co. ....                | 57                      |   |                    |
| Nicholson File Co. ....                     | 6                       |   |                    |
| Northern Crane Works ....                   | 39                      |   |                    |
| Norton, A. O. ....                          | 59                      |   |                    |
| Nova Scotia Steel & Coal Co. ....           | 59                      |   |                    |
|   |                         |   |                    |
| <b>O</b>                                    |                         |   |                    |
| Oakley Chemical Co. ....                    | 135                     |   |                    |
| Oliver Machinery Co. ....                   | 11                      |   |                    |
| Ontario Metal Products Co. ....             | 119                     |   |                    |
|   |                         |   |                    |
| <b>P</b>                                    |                         |   |                    |
| Parker Co., Chas. ....                      | 27                      |   |                    |
| Parmenter & Bulloch Co. ....                | 149                     |   |                    |
| Perfect Machine Co. ....                    | 126, 127                |   |                    |
| Petrie Co., Ltd., H. W. ....                | 48                      |   |                    |
| Philadelphia Gear Works ....                | 151                     |   |                    |
| Photostat Corporation ....                  | 41                      |   |                    |
| Pilot Steel & Tool Co. ....                 | 43                      |   |                    |
| Pink, Thomas ....                           | 53                      |   |                    |
| Pratt & Whitney, Inside front cover         |                         |   |                    |
| Puro Sanitary Drinking Fountain Co. ....    | 116                     |   |                    |
|   |                         |   |                    |
| <b>Q</b>                                    |                         |   |                    |
|   |                         |   |                    |
| <b>R</b>                                    |                         |   |                    |
|   |                         |   |                    |
| <b>S</b>                                    |                         |   |                    |
|   |                         |   |                    |
| <b>T</b>                                    |                         |   |                    |
|   |                         |   |                    |
| <b>U</b>                                    |                         |   |                    |
|   |                         |   |                    |
| <b>V</b>                                    |                         |   |                    |
|   |                         |   |                    |
| <b>W</b>                                    |                         |   |                    |
|   |                         |   |                    |
| <b>X</b>                                    |                         |   |                    |
|   |                         |   |                    |
| <b>Y</b>                                    |                         |   |                    |
|   |                         |   |                    |
| <b>Z</b>                                    |                         |   |                    |
|   |                         |   |                    |



**MADE-IN-CANADA**

# Torrington

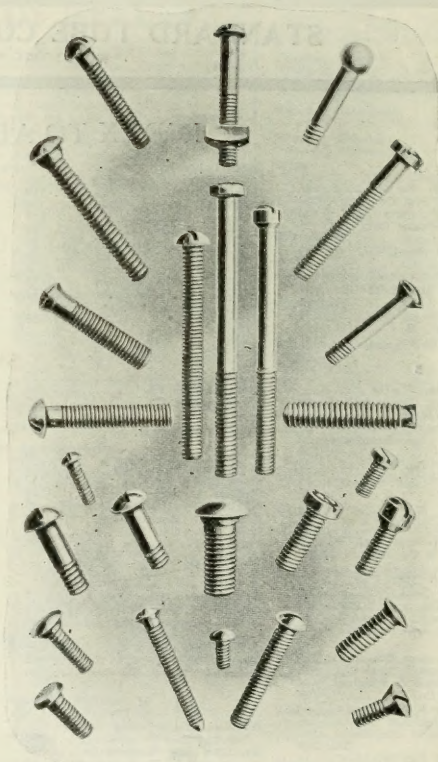
**MACHINE  
SCREWS**

**When you send  
us one order  
we expect more!**

UNLIKE some manufacturers we do not try to make a large profit on one order by charging an exorbitant price for the quality put into the products.

We believe that the repeat orders which result from selling high-grade products at moderate prices are more profitable to a firm in the end.

To convince yourself that machine and special screws, as we supply them, are far better value than any you have had in the past, write us for samples.



*Manufacturers of standard and special machine screws, rivets, threaded wires and specialties in head work. Large quantities carried in stock for Quick Delivery.*

**THE TORRINGTON COMPANY, LIMITED**  
**UPPER BEDFORD, QUE.**

# BANFIELD

**D**URING recent years this company was compelled to decline much desirable business and many connections that would have been highly appreciated, because enquiries could not be considered without prejudice to the important government work entrusted to us.

Present conditions suggest an opportunity for you to establish connections with a concern whose manufacturing facilities are not excelled in this country, and whose record on the important matter of service makes such a connection a real asset.

We are equipped to handle stampings in all metals, gauges and finishes.

You blueprint or sample will bring you our estimate.

**W. H. Banfield & Sons, Limited**

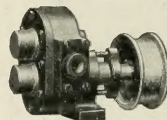
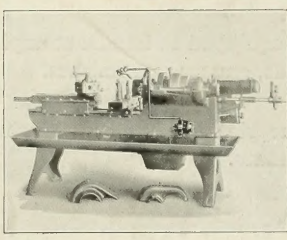
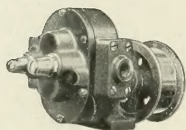
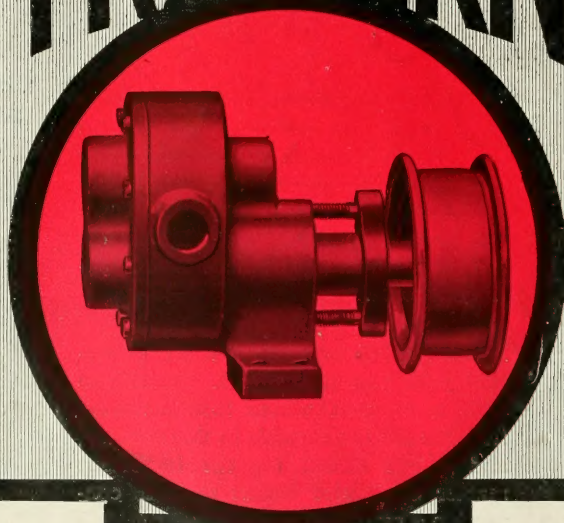
TORONTO

# STAMPINGS



# TRAHERN

REG. TRADE MARK



## TRAHERN PUMPS SAVE TOOLS

By delivering to your machine tools a steady, forceful supply of free-from-grit coolant, Trahern Circulating Pumps add life to cutting tools. Trahern Rotary Geared Pumps have every essential—low speed, large capacity and long life. They pump water, oil or compound and will operate against 100 lbs. pressure, reverse automatically with machine and supply of coolant may be shut off at discharge without stopping pump. Typical installation shown in centre picture.

**TRAHERN PUMP DIVISION**  
GEO. D. ROPER CORPORATION  
ROCKFORD, ILL., U.S.A.